Oct. 26, 1943. R. FELLOM 2,332,705

WALL CONSTRUCTION

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Fig. 1

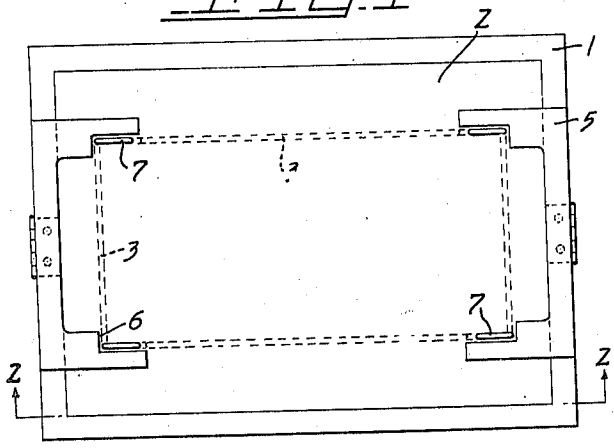



Fig. 2

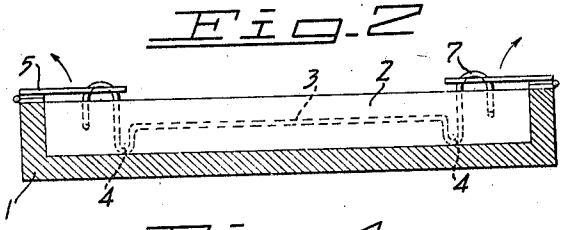



Fig. 3

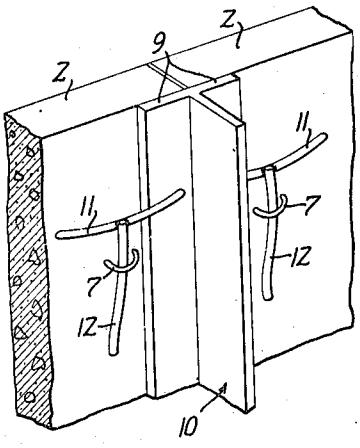



Fig. 4

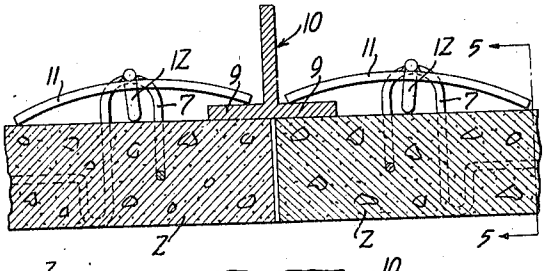
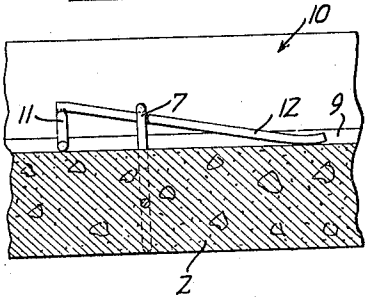



Fig. 5



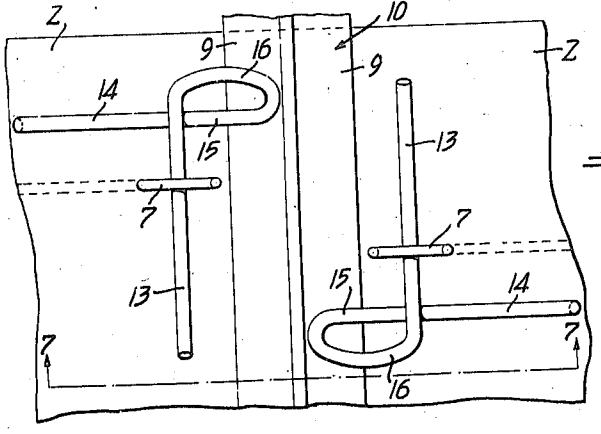




Fig. 6

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Fig. 7

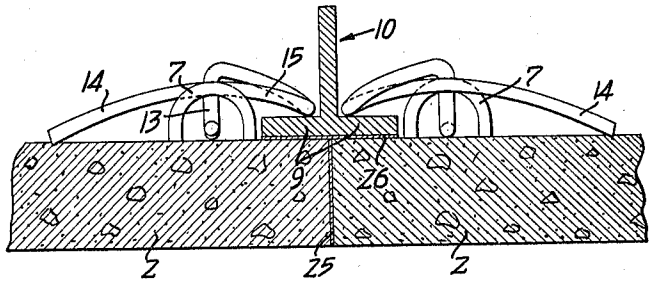



Fig. 9

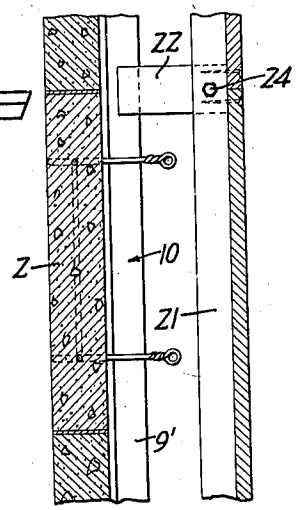



Fig. 8

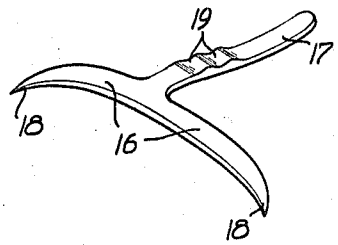
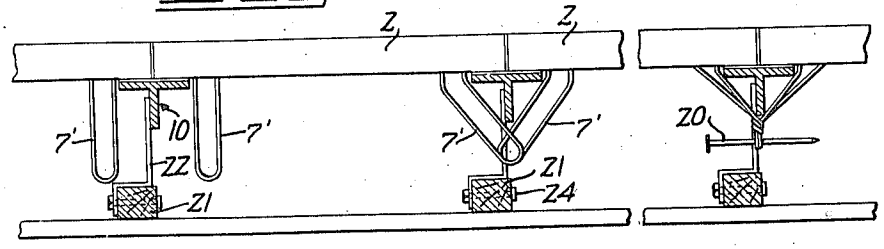



Fig. 10




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# UNITED STATES PATENT OFFICE

2,332,705

## WALL CONSTRUCTION

Roy Fellom, San Francisco, Calif.

Application February 7, 1941, Serial No. 377,808

5 Claims. (Cl. 72—20)

This invention relates to wall construction of the type in which the wall comprises pre-formed slabs of relatively rigid material secured to steel studding. One of the objects of the invention is improved slab construction provided with means secured thereto and arranged in a particular relation relative to the studs, for use in securing the slab to the studs.

Another object is improved means for securing preformed slabs to spaced, parallel studs having planar, oppositely extending flanges extending longitudinally thereof, and which means includes a clip-like member cooperating between the stud flanges and slabs to progressively tighten the slabs to the studs with increased, but yieldable pressure upon sliding such members bodily relative to the slabs and studs in a direction longitudinally of the latter.

A still further object is a hollow wall, having combination steel and wood studs supporting and spacing opposed sides of such wall, one of which sides is formed of pre-formed slabs of cementiticus material, such as Portland cement and sand, or concrete joined at adjacent edges at such studs and backed by imperforate and continuous portions of the studs extending across such juncture, while the other of said sides is secured to the wood portions of the studs, as by nailing, and which studs are constructed to facilitate the securement of the slabs to the steel portions of the studs at points between the sides of the wall and between the wood and metal portions of said studs.

Other objects and advantages will appear in the description and drawings annexed hereto.

In the drawings,

Fig. 1 is a plan view of a slab in a mold form.

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary perspective view of a pair of adjacent corners of two slabs secured to a stud by clips that form a part of the invention.

Fig. 4 is an enlarged fragmentary sectional view through a stud and adjacent corners of a slab showing the attaching clips in place securing the adjacent pairs of blocks to a stud.

Fig. 5 is a sectional view taken along line 5—5 of Fig. 4.

Fig. 6 is an enlarged, fragmentary, elevational view of adjacent corners of a pair of slabs secured to a stud by slightly different clips than is shown in Fig. 4.

Fig. 7 is a sectional view taken along line 7—7 of Fig. 6.

Fig. 8 is a perspective view of a slightly modified form of clip.

Fig. 9 is a vertical sectional view of a hollow wall in which the slabs are held to the steel studs by elongated loops of wire carried by the slab.

Fig. 10 is a horizontal view showing the hollow wall of Fig. 9, with the two opposed sides of the wall in elevation, and with the wire loops being shown in the several stages of being formed.

In my co-pending application, Ser. No. 268,248, filed April 7, 1939, I show wall construction, which, in general, shows a somewhat similar type of wall construction, and this application relates more to specific improvements in this general type of construction.

In detail, in Figs. 1 and 2, is shown a mold form 1 for molding a rectangular slab 2 of cementitious material, such as concrete, or where smoother finished slab is desired, it may be made of sand and cement or composition material suitable for casting or pressing to shape. The mold form constitutes no part of my invention in itself, but is helpful to an understanding of the advantages of the structure of the slab.

The slab 2 has embedded centrally therein a rectangular wire frame 3 that is disposed in the plane of the slab. This frame has legs 4 (Fig. 2) adjacent the corners thereof, which legs are formed by making U-shaped bends in the wire of said frame at said corners projecting laterally of the plane of said frame to one side thereof. The U-shaped legs 4 provide means on the frame for supporting the same on the bottom of the mold form in a plane parallel with said bottom, and at a distance above the latter so that the sides of said frame will be centrally in the slab 2 when the material forming said slab is placed in the mold form. Hinged guide elements 5 may be secured to two opposite sides of the mold form, which elements carry notches 6 for positioning the wire frame centrally in the mold form relative to the sides of the latter. Thus the wire frame will be centrally in the slab, as to its structure and with respect to the dimensions at right angles to said thickness.

Also the wire of said frame is formed to provide U-shaped loops 7 adjacent the corners of said frame, which loops project to the side of said frame opposite the legs 4 and are longer than said legs so as to project outwardly of one of the sides of the slab. The loops so projecting from one side of the slab are parallel with two opopsite edges of said slab and the pair of loops at the edge adjacent thereto provide eyes

in alignment with each other for purposes hereafter described. When the slabs are hardened with the frame therein, they are removed from the wall forms for use. The legs 4 and loops 7 are integral with the sides of the wire frame, and as said sides extend along all four margins of the slab, it is seen that the slab is strongly reinforced in a simple and effective manner.

The slabs, as above described, are particularly suitable for securement against the planar flanges 9 of steel T iron studs 10, as best illustrated in the several drawings, the same numbers being used in all of the drawings to designate the studding.

The slabs are, in all instances, positioned against pair of studs with the pairs of loops 7 at each of the two opposite margins of the slab adjacent one of the studs, and said loops are disposed with their openings in parallel alignment with the stud adjacent thereto.

In Figs. 3 to 7, the loops 7 are relatively short, and open in directions longitudinally of the stud that is adjacent the same. In the above figures, it is to be understood that each slab has its two opposite margins against one of the flanges 9 of a pair of studs 10, and there are preferably a pair of loops 7 adjacent each stud. Only one loop on each slab is shown in said Figs. 3 to 7.

In Figs. 3 to 5, the clips for securing the slabs to the studs, each comprise a T having arms 11 forming the head or cross bar, which head is bowed longitudinally. The leg 12 of the T is secured to the head centrally between the ends of the latter, on the convex side thereof, by welding and the end of the leg adjacent said head preferably terminates about flush with the side of the head as indicated in Fig. 5. The arms 11 forming the head, and the leg 12, of the clip shown in Figs. 3 to 5 are preferably made of relatively heavy resilient wire so as to have a spring action when in position securing the slab to the stud.

In operation, each slab 2 is positioned against the adjacent flanges 9 of a pair of spaced, parallel studs that are disposed with their flanges planar, and then the leg 12 of each clip is inserted through one of the loops 7. The outer ends of the arms 11 engage the rear side of a flange 9 and its rear side of slab 2, respectively. The leg 12 is so positioned relative to the arms forming the cross head that the outer end thereof engages the rear side of the slab when the concave side of the cross head faces the slab. Thus the clip is supported at three points, namely, at the outer ends of the arms 11 and at the outer end of the leg. Upon driving, or forcing the clip in direction longitudinally of the leg 12 from the end of the leg at the cross head, it will be seen that the leg will engage the side of loop 7 facing the slab with progressively increasing pressure causing the leg and cross head to tend to flatten out, thus yieldably holding the slab tight against the stud that is engaged by one end of cross head 11.

The clip, when tightly, but yieldably, securing the slab to the stud that it engages, will not slip out of its tightened position except by driving the clip in the opposite direction, since the sharp edges at the ends of the cross head 11 will dig into the rear sides of the slab and flange 9, as best illustrated in Fig. 4. The outer end of leg 12, however, is slightly curved, as indicated in Fig. 5, to prevent digging into the slab. Also, it is important to note that the length of the leg 12 is such that it engages the loop 7 at an angle that tends to frictionally retain the leg against sliding out of the loop.

In Figs. 6, 7, the clip is made from a single wire bent so as to provide a cross head and leg, with the cross head bowed similarly to the cross head of Fig. 2. In this form of the invention the leg 13 and one arm 14 of the cross head are relatively long with respect to the other arm 15 of said cross head, and said arm 15 is connected with leg 13 by a length 16 of the wire forming the clip, which length is doubled back alongside leg 15 to connect with the end of leg 13 adjacent the cross head where leg 13 passes over the legs 14, 15. While the arms 14, 15 may be of the same length, the construction as shown provides for greater resiliency of the arm 14 while permitting the loops 7 to be relatively close to stud 10. In this form of the invention, the same clip may be used on opposite sides of stud 10, but since the outer end of arm 14 should tend to dig into the slab, the clips are preferably reversed in their positions at opposite sides of stud 10, as best illustrated in Fig. 6. This brings the smoother outer end of arm 15 against the stud, while positioning the sharper outer end of arm 14 against the slab.

It is manifest that the manner of functioning of the clip shown in Figs. 6, 7 is substantially the same as that described for the clip illustrated in Figs. 3 to 5. To gain the desired strength, the leg 13 must pass over the juncture between arms 14, 15, since the leg will then act as a brace for the arms at said juncture when the clip is in position.

The clip shown in Fig. 8 is one that is stamped out of resilient sheet metal. Thus the arms 16 and leg 17 are flat. The general contour is the same as for the clip illustrated in Figs. 3 to 5, but the ends of arms 16 are cut off transversely of the width of the arms to form pointed ends 18 that will engage the stud flange and slab, respectively, in a manner to resist any tendency of the clip to become loosened once the leg 17 is in tight engagement with one of loops 7. Also, if desired, in this clip as well as those of Figs. 3 to 7, there may be slight indentations 19 formed on the back of leg 17 to engage the loop 7 against any tendency of the leg to slip relative to the loop when in use.

In all of the above forms of the invention the loops 7 may be substantially identical, and the openings in all loops 7 face in the same direction longitudinally of the stud flanges. The provision of equal length arms on the clips of Figs. 3 to 5 and Fig. 8, eliminates any necessity for right and left hand clips, hence is preferable to clip having arms of unequal lengths, since it is desirable that all clips be driven downward to tightening position rather than driving them upwardly. The clips in all forms, are however, loosened by driving or forcing them out of engagement with the loops in a direction opposite to that in which they were tightened.

The use of spring clips is highly desirable for the reasons that the slabs will not be broken during tightening of the slabs by such clips, and a small amount of "give" can take place between the studs and slabs in the event of excessive tremors of the building, and in the event of an earth quake. It is important to also note that the action of the clips is a wedge action.

In Figs. 9, 10 the loops 7' are much longer than the loops used with the clips. Their length is such that when the slabs are positioned against the stud flanges, the loops at opposite sides of

such slabs may be brought to registration over the rear edge of the stud as indicated in Fig. 10 (central stud), so that the loops register with each other. A nail or spike 20 inserted through the registering loops may then be used to twist the wires and to draw the slabs 2 against the studs. The wire so twisted will hold the slabs tight against the stud.

The hollow wall shown in Fig. 9 is formed by securing nailing strips 21 of wood to the stud 10, in spaced relation to the latter and parallel therewith, by brackets 22 that are spot welded to the leg 9' of the studs.

The outer ends of said brackets are bent, as indicated in Fig. 10, to form sockets for sealing the nailing strips therein and the nailing strips are secured to said brackets by bolts 24.

This construction spaces the nailing strips 21 from studs 10 leaving clear the rear sides of the studs for easy insertion of the spring clips as shown in Figs. 3 to 8, or for twisting the loops 7' of Fig. 10.

The slabs are preferably connected at their adjacent edges by a plastic material 25, and asphaltum impregnated strips 26 (Fig. 7) may be interposed between the sides of the studs that are engaged by the margins of the slabs, thus forming waterproof joints that are slightly yieldable, since the plastic used is of the type that does not become excessively hard.

The manner of supporting the loops 7 as integral parts of a rectangular wire frame imbedded in each slab, provides a structure that practically eliminates any chance of breakage of the material of the slab since the adjacent sides of the frame carry each loop. Also the slabs are reinforced along lines extending at right angles to each other, which greatly strengthen the slab. This feature is important where there is a wedging action effected by the clips, since it is manifest that the slabs may be drawn against the studs.

Having described my invention, I claim:

1. In wall construction including a wall forming slab having one of its margins supported against one flange of a structural steel wall supporting frame; clamping means for clamping said margin against said frame comprising a metal loop secured to said slab with the loop opening directed generally parallel with said flange and disposed adjacent the said flange, and a generally T shaped clamping member of resilient material disposed with the leg thereof extending through said loop opening and engaging the inner side of said loop remote from said slab, and the arms respectively engaging said slab and the side of said flange opposite the side engaged by said margin, said leg portion of said clamping member being supported in said loop opening for sliding longitudinally of said leg, said arms being spaced intermediate its ends from said slab and from said flange to support the end of the leg at said arms spaced from said slab and flange, and to support the opposite end of said leg against said slab during said movement, whereby said arms will yieldably hold said margin against said flange with progressively increased pressure as said leg is moved through said opening with the outer end of the leg foremost.

2. In wall construction including a wall forming slab having one of its margins supported against one elongated flange of a structional steel wall supporting frame; a metal loop secured on said slab with its loop opening adjacent said flange and outwardly of the side of the slab that is against said flange and directed generally parallel with said flange; a spring wire clamping member of generally T shape positioned with the leg thereof extending through and engaging the inner side of said loop and with the outer ends of the arms thereof respectively engaging the said side of said slab and the side of said flange that is opposite said margin, securing said slab against said flange.

3. In a construction as defined in claim 2, said arms being formed to engage said slab and said flange at the outer ends only thereof and spaced from said slab and flange between said outer ends, and said leg engaging said slab at its outer end only and also slidably engaging the inner side of said loop that faces said slab at a point between its ends.

4. A wall construction including a wall forming slab having one of its marginal portions supported against one of the flat sides of a flange of a structural steel wall supporting frame; a metal loop carried by said slab and projecting therefrom adjacent said flange; clamping member of resilient metal yieldably and releasably securing said slab to said flange; said member extending through the opening of said loop and in yieldable engagement with the inner side thereof and projecting from opposite sides of said opening, the portion of said member projecting from one side of said opening being in yieldable engagement with said slab and with the side of said flange that is opposite the said marginal portion of the slab, and the portion of said member projecting from the other side of said opening being in yieldable engagement with said slab.

5. A construction as defined in claim 4, said member being of generally T shape with the said portion thereof at one side of said opening including the head of the T and the portion at the other side of said opening including the part of the leg of the T adjacent its free end.

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