May 26, 1959 E. L. McKAY 2,887,869

BUILDING BLOCK AND BEAM AND WALL STRUCTURES OF SAME

Filed May 28, 1953 3 Sheets-Sheet 1

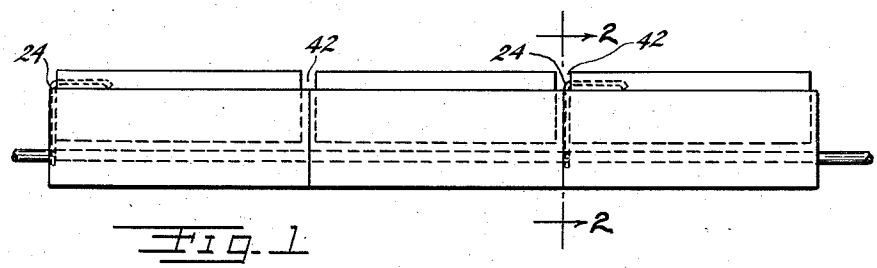


FIG. 1

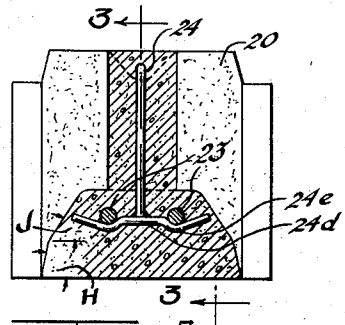


FIG. 2

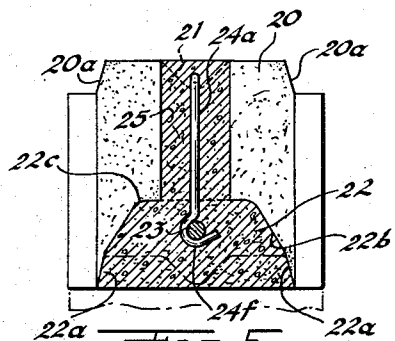


FIG. 5

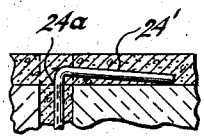


FIG. 4

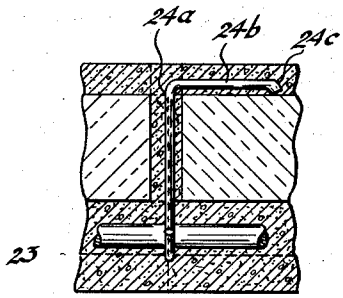


FIG. 3

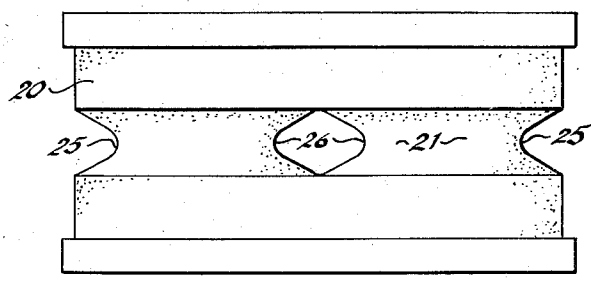


FIG. 6

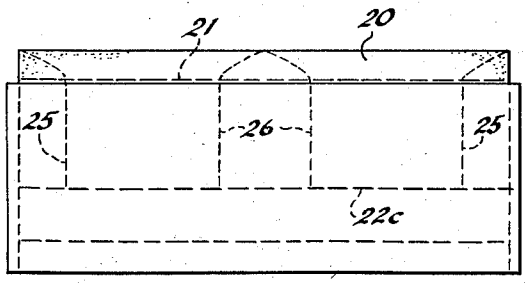


FIG. 7

INVENTOR.
EDWIN L. McKAY
BY
Hyde, Myers, Baldwin & Doran
ATTORNEYS

May 26, 1959 E. L. McKAY 2,887,869

BUILDING BLOCK AND BEAM AND WALL STRUCTURES OF SAME

Filed May 28, 1953 3 Sheets-Sheet 2

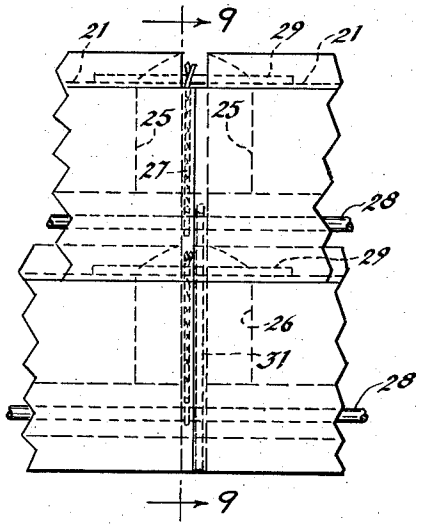


Fig. 8

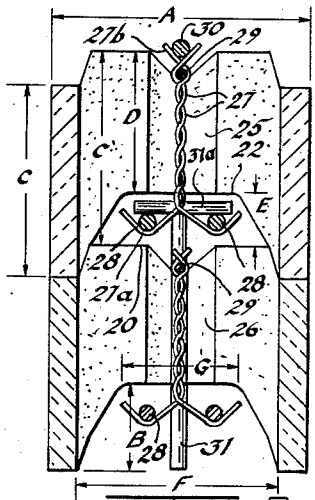


Fig. 9

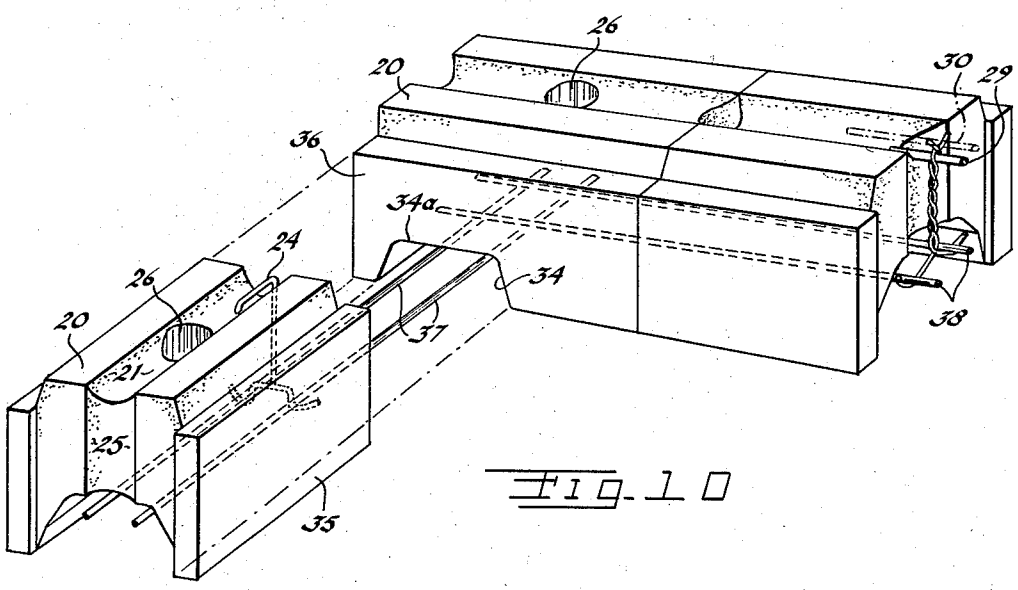


Fig. 10

INVENTOR.
EDWIN L. McKAY

BY
Hyde, Meyer, Baldwin & Doran
ATTORNEYS

May 26, 1959 E. L. McKAY 2,887,869

BUILDING BLOCK AND BEAM AND WALL STRUCTURES OF SAME

Filed May 28, 1953 3 Sheets-Sheet 3

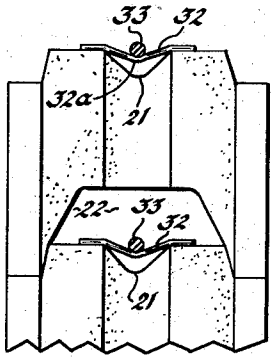


FIG. 11

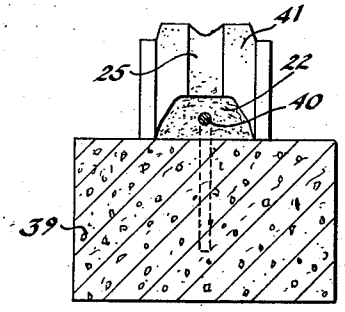


FIG. 10

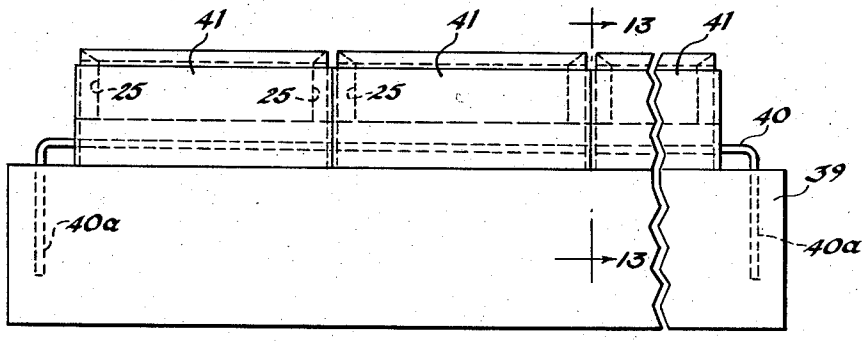


FIG. 12

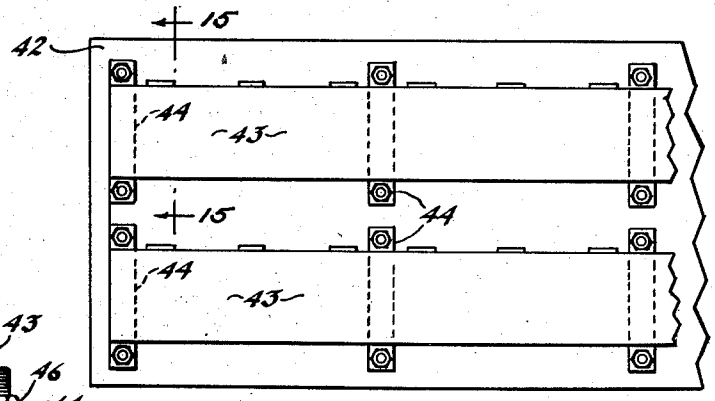


FIG. 14

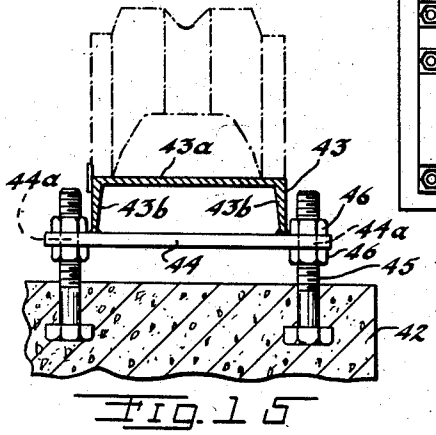


FIG. 15

INVENTOR.
EDWIN L. McKAY
BY
Hyde, Meyer, Baldwin & Dram
ATTORNEYS

United States Patent Office 2,887,869
Patented May 26, 1959

2,887,869

BUILDING BLOCK AND BEAM AND WALL STRUCTURES OF SAME

Edwin L. McKay, Atlanta, Ga., assignor to Ray Ferwerda and Koop Ferwerda, Miami, Fla.

Application May 28, 1953, Serial No. 358,104

2 Claims. (Cl. 72—42)

This invention relates to improvements in a building block and beams and wall structures made of the same.

An object of the present invention is to provide an improved building block having a longitudinally extending rib on its upper side and having a longitudinally extending recess in the lower side of the block, the recess being of greater depth than the height of the rib so as to provide a mortar space there between two blocks when they are assembled one on top of the other in a beam or wall structure, the side walls of the recess corresponding in shape to the sides of the rib up to the height of the rib and the sides of the recess above the rib converging inwardly and upwardly at an angle of between forty-five and seventy-five degrees to the vertical and then blending into the flat, horizontally extending bottom of the recess with a large radius so as to maintain optimum structural block strength while still providing ample space for one or more reinforcing steel rods in the mortar space with ample room for the mortar to completely surround the reinforcing steel.

Another object of the present invention is to provide a wall construction formed of the above-mentioned blocks together with hangers supported on the blocks and holding longitudinally extending reinforcing rods supported on the hangers and spaced from the walls of the mortar space, a preferred form of construction providing two parallel reinforcing rods supported on the hangers and approximately equally spaced from the top surface of the horizontal ribs of the blocks and equally spaced from the bottom and sides of the mortar space recess. A further object of the present invention is to provide novel hanger means for supporting reinforcing rods with respect to the building blocks.

A still further object of the invention is to provide beams for use as lintels over doors and windows or other places where beams are needed in building construction, such beams being made up of my novel building blocks tied together with suitable reinforcing so as to provide a very strong but cheap beam structure.

A further object of the present invention is the provision of novel means for anchoring the first row of blocks to a concrete floor base or footing by prelocated steel U-shaped members which project upwardly from the base or footing so that a longitudinal extending portion thereof is positioned centrally of the lower groove of a course of my improved building blocks positioned over the steel members so as to prevent the blocks from being displaced by lateral thrust or blows and preventing an upward thrust of the wall from the base or footing under the action of a storm or similar forces.

A further object of the present invention is to provide a means of connecting two walls together at an angle when said walls are built out of my improved building blocks described above without the necessity of utilizing a junction block or corner block of any sort.

Other objects and advantages of my invention will be apparent from the accompanying drawings and description and the essential features thereof will be set forth in the appended claims.

In the drawings,

Fig. 1 is a side elevational view of a beam constructed from a plurality of my improved building blocks and tied together with reinforcing rods.

Fig. 2 is an enlarged transverse sectional view taken along the line **2—2** of Fig. 1.

Fig. 3 is a longitudinal sectional view taken along the line **3—3** of Fig. 2.

Fig. 4 is a fragmental sectional view similar to the upper portion of Fig. 3 and showing a modified form of hanger hook.

Fig. 5 is a transverse sectional view of a beam similar to Fig. 2 and showing a modified form of hanger for supporting a single reinforcing rod.

Fig. 6 is a top plan view of a single building block enlarged and showing one of the blocks of Fig. 1.

Fig. 7 is a side elevational view of the building block of Fig. 6.

Fig. 8 is a fragmental side elevational view of a portion of a wall utilizing my improved building blocks and showing another modification of the hanger for supporting the reinforcing rods from the building blocks. This view omits the grout.

Fig. 9 is a transverse sectional view taken along the line **9—9** of Fig. 8.

Fig. 10 is a sectional view, exploded, showing a cut-out block utilized for tying in a wall extending at an angle to another wall.

Fig. 11 is a transverse sectional view similar to Fig. 9, but showing another modification of a hanger suitable for supporting reinforcing rods.

Fig. 12 is a side elevational view showing my invention as utilized for anchoring the first row of the blocks of a wall to a concrete floor base or footing.

Fig. 13 is a transverse sectional view of the same taken along the line **13—13** of Fig. 12.

Fig. 14 is a top plan view of steel channels utilized for assembling and casting beams of the type made possible by my invention, while

Fig. 15 is a transverse sectional view enlarged taken along the line **15—15** of Fig. 14 and showing in dot-dash lines the position of a course of building blocks on the channel as a beam is being constructed.

Referring first to Figs. 2, 3, 5, 6 and 7, my invention comprises a novel building block which is here shown as of the general character of a concrete building block such as is commonly used for buildings today.

My improved block has a longitudinally extending rib **20** on its upper side, this rib preferably being of a width only slightly less than the width of the block. For instance, in one form of my invention, the width of the rib at F is approximately six inches while the total width of the block A is approximately eight inches. The top surface of the rib is substantially flat and horizontal, but in a preferred form of my invention, I provide a central longitudinally extending groove **21** which, in the same embodiment of my block is approximately two inches wide and one inch deep.

In the lower side of the block, I provide a recess **22** of greater depth than the height of the rib **20**, thus providing a mortar space there when two courses of said blocks are assembled one on top of the other as, for instance, as seen in Fig. 9. The side walls **22*a*** of the recess correspond in shape to the sides of the rib **20*a*** up to the height of the rib when blocks are assembled one upon the other as indicated in dot-dash lines in Fig. 5. These walls **22*a*** and **20*a*** may extend upwardly at a very steep angle preferably between 75 and 90 degrees to the horizontal. The sides **22*b*** of the recess above the rib

height converge inwardly and upwardly at an angle between 45 and 75 degrees to the vertical, about 60 degrees being my preferred form. The bottom of the recess at **22***c* is generally flat and horizontally extending and the walls **22***b* blend into the bottom **22***c* with large radius curves so as to preserve the strength of the building block as much as possible. In the same embodiment of my invention mentioned above, the height of the rib **20** above the side walls of the block, that is: the vertical height of the walls **20***a* and of the walls **22***a* is approximately one inch. The complete depth of the recess indicated at **22** and marked B is approximately 2¾ inches. The flat horizontal extent of the bottom **22***c* is about 3½ inches. The dimension C is approximately 6 inches and the dimension D is approximately 4¼ inches. Other relations shown by the dimensions are as follows: B equals .33A; B equals .647D; E equals .29C; E equals .41D; F equals .75A; and G equals .44A. These dimensions provide a sizable mortar space in the recess **22** between two superposed courses of my improved blocks while at the same time preserving the maximum strength of the building blocks as it is assembled into a completed beam or wall.

For maximum strength of a beam as shown in Fig. 1 or 10, or of a wall as shown in Figs. 8 and 9, I incorporate longitudinally extending reinforcing rods **23** extending through a plurality of the recesses **22** when a course of blocks is laid end to end. In order to properly locate these reinforcing rods for the maximum beam strength and for maximum life of the reinforcing steel, I provide novel hanger means.

In Figs. 2 and 3 I show a hanger having a hook-shape upper end including a vertical rod **24***a* having its upper end bent at right angles to provide the hook **24***b* adapted to rest in one of the grooves **21** of my improved building block. The distal end of the hook is shown in Fig. 3 as being bent downward slightly at **24***c* so as to space the hook slightly from the bottom of the groove, allowing for grout there, and so as to better support the portion **24***a* in vertical relationship. The lower end of the rod **24***a* has either integral with it or attached rigidly thereto, as by welding, the generally horizontally extending portion **24***d*, having oppositely extending branches which are slightly notched downwardly at **24***e* so as to provide seats for two reinforcing rods **23** extending longitudinally. For maximum beam strength, these hangers **24** are placed one at the end of each block, but otherwise they may be placed only as often as necessary to properly position the reinforcing steel. For instance, in Fig. 1, these hangers are shown as placed in every other block.

In order to provide space for extending the hangers **24** downwardly, the blocks are provided with vertically extending grooves **25** at opposite ends of the block and extending from groove **21** downwardly to the recess **22**, the grooves **25** being in registration with the grooves **21**. If necessary or desirable, an additional groove **26** may be placed centrally of each block and extending from the groove **21** downwardly to the recess **22**. With this positioning of the grooves **25** and **26**, when the blocks are laid in a wall, the grooves **25** of one course will lie vertically above the groove **26** of the course below, and thus mortar or cement grout may be poured downwardly from the top of the wall and will penetrate to the bottom of the wall filling all of the grooves and recesses.

In Fig. 4 I have shown a modification of the hook arrangement **24***b* and **24***c*. Here a hook **24'** is made by bending the hanger rod so as to form an angle of slightly less than 90 degrees with the vertical portion **24***a* of the hanger. This performs the same function as the portions **24***b* and **24***c* of Fig. 3. The rest of the hanger of Fig. 4 may be made as described in Fig. 3.

The hanger shown in Fig. 5 has a vertical stem **24***a* like that previously described and a hook portion either like that shown in Fig. 3 or Fig. 4 corresponding to the parts **24***b*, **24***c* of Fig. 3 or **24'** of Fig. 4. The only difference in this hanger is that a single hook **24***f* is provided at the lower end of the portion **24***a* to support a single reinforcing rod **23** extending axially of the mortar space **22** of a plurality of blocks.

In Figs. 8 and 9 a different type of hanger is shown composed of a pair of stiff wires **27** twisted together to provide a vertical stem portion and extending laterally away from each other at the lower end of the vertical stem portion to provide a pair of notches or seats **27***a* for receiving two reinforcing rods **28**. A small bar **29** is run through one of the loops of the twisted wires **27** near the top of the straight stem portion and this bar extends horizontally across the space between abutting blocks to rest in the grooves **21** and spanning the openings **25**. The hanger **27** supports the two reinforcing rods **28** in approximately the same location in the mortar space **22** as was true in the case of Fig. 2.

If necessary or desirable, the upper ends of the wires **27** may be extended as shown at **27***b* so as to provide a Y-shape support for another reinforcing rod **30**.

A manner of providing vertical reinforcing is illustrated in Figs. 8 and 9. A vertical reinforcing rod **31** is provided with a T-shape upper end **31***a* which rests upon a pair of reinforcing rods **28** in one course of blocks and extends downwardly through one or more courses of blocks below it. This gives a vertical reinforcing extending downwardly through the groove **25** in one block and the groove **26** of the block in the next adjacent course.

Still another form of hanger is shown in Fig. 11. Here a short hanger **32** spans one of the grooves **21** and is slightly bent downwardly in the middle to provide a seat at **32***a* for holding and centering a reinforcing rod **33**. This is a simple way of supporting a reinforcing rod and yet it gives a positive spacing of the reinforcing rod in the mortar space **22** and also spaced from the sides of the grooves **21**.

In all forms of my hanger devices, it will be noted that the reinforcing rod or rods is held spaced from the walls of the block and preferably these are so arranged that there is at least one inch to one and one-half inches of mortar or cement grout between the reinforcing rod and the nearest surface. This gives a maximum strength to the reinforcing and gives protection to the reinforcing rod so that the covering of the rod does not readily spall or crack away, thus exposing the reinforcing rod to the action of rust. In the reinforcing arrangement shown in Figs. 2 and 9, each of the reinforcing rods **23** or **28** respectively is approximately equally distant from the top of a rib **20** below the reinforcing rods and from the side walls **22***b* and bottom wall **22***c* of the recess **22** through which the reinforcing rods pass. This gives maximum strength to the beam or wall in which the reinforcing rods lie and gives good protection to the reinforcing rods against rust.

In Fig. 10, I have shown how a very slight change in one of my improved building blocks will arrange for a partition wall or end wall at a corner to be attached to a side wall without the use of a special junction block or special corner block. All parts except those about to be described are like those already described and have been given similar reference characters. The only difference here is that a notch **34** has been cut through the side wall **22***b* of a recess, this notch having a width approximately equal to F and a total depth approximately equal to B up to the flat bottom of the notch indicated at **34***a*. It results from this construction that one of my standard blocks **35** may have its end abutting against the block **36** and reinforcing rods **37** extending through block **35** and other blocks in the same course will lie contiguous to and crossing the reinforcing rods **38** extending through block **36** and other blocks in the same course with it. The rods **37** and **38** may be tied together at their crossing points if desired. The angular wall represented by block **35** can thus be firmly tied into the side wall represented by the block **36** with very little effort. It will be understood that the block

35 has been shown moved away from the block 36 in Fig. 10, merely to illustrated the construction more clearly.

In Figs. 12 and 13 I have shown my improved method of anchoring the first row of blocks at the lower side of a wall to the concrete floor base or footing. Here the floor base or footing is shown at 39 and a U-shape steel member 40 has its legs turned downwardly and embedded in the footing 39 at 40*a*. A course of blocks 41 in all respects like the blocks previously described, is laid upon the footing with the rod 40 extending through the recesses 22 of the row of blocks and approximately centered in the recess as clearly shown in Fig. 13. When mortar or cementing grout is poured in through the openings 25 to fill the end to end recesses 22 solidly, the reinforcing rod 40 is firmly bound into the lower course of blocks 41, 41. It results from this construction that the row of blocks 41 at the bottom of the wall are prevented from being displaced by lateral thrust or blows and it prevents an upward thrust of the wall based upon the blocks 41 under the action of a storm or otherwise.

My invention also comprises as a building member, a beam structure made up of one or more courses of my reinforced building blocks as herein described. In other words, a single course beam as built up and shown in Figs. 1 and 2, and preferably with mortar or cement filling the spaces 42 between the abutting ends of blocks, provides an acceptable building beam. Other preferred forms of such beams constructed by me would be formed of two courses as shown in Figs. 8 and 9 or I may even form them with three or more courses, one upon the other. Such beams may be used over building openings, such as: doors, windows, and porches or they may be used as floor joists, and I have also used them beneath the main walls of a building where my improved beams are placed upon spaced footings and support the entire side wall on the beam. This avoids the cost of footings under the entire side wall.

In constructing the above described beams, it is important that an elongated plane surface be provided as a base. Such a construction is shown in Figs. 14 and 15. A base 42 of concrete or the like is provided extending the full length of one or more beams. An elongated floor member 43 is provided, the length and width of the beam to be constructed. A preferred form of such floor member is a steel channel as shown having its web 43*a* uppermost and having its flanges 43*b* extending downwardly. Cross members 44 in the form of stiff strips of steel are welded to the lower edges of the flanges 43*b* and extend out on opposite sides of the channel. Openings 44*a* are provided through these strips at opposite ends thereof as indicated in Fig. 15 and bolts 45 fixed in the concrete base extend upwardly through each of the holes 44*a*. Nuts 46 are threaded on the bolts above and below each strip 44 and serve to positively position each end of the strip relative to the base 42. It results from this construction that a steel channel which always has some warped condition as received, may be adjusted by means of the bolts 45 and nuts 46 along the entire length thereof upwardly or downwardly at each spaced strip 44 so that the upper surface of the web 43*a* finally lies in a single plane along the entire length of the beam.

What I claim is:

1. Wall construction comprising superposed similar building blocks, each block having a longitudinally extending rib on its upper side, said rib being of a width only slightly less than the width of the block and having a substantially flat horizontal top surface, there being a longitudinally extending recess in the lower side of each block, said recess being of greater depth than the height of said rib and providing in block assembled position a laterally enclosed mortar space between said blocks, the side walls of said recess corresponding in shape to the sides of said rib for the height of said rib to fit therein in block assembled position, the sides of said recess above said rib height converging inwardly and upwardly at an angle between 45 degrees and 75 degrees to the vertical, the bottom of said recess being flat and horizontally extending, hangers supported on said blocks, parallel longitudinally extending reinforcing rods supported solely by said hangers in said mortar space approximately equally spaced from said rib horizontal top surface and from said bottom and sides of said recess at a sufficient distance for mortar to surround each rod, and means communicating down through said blocks to said mortar space.

2. The combination of claim 1 wherein a vertical groove extends downwardly through each block from said top surface to said recess, and said hangers rest upon said top surface to be secured in the mortar space thereat and extend down through and are completely enclosed by said grooves, whereby mortar poured downwardly through the grooves in the assembled blocks fills said grooves and mortar space and surrounds said reinforcing rods and hangers to provide a reinforced block wall construction with mortar protected reinforcing rods.

References Cited in the file of this patent

UNITED STATES PATENTS

856,615	Ajello	June 11, 1907
1,158,197	Francis	Oct. 26, 1915
1,165,475	Werkenthin	Dec. 28, 1915
1,227,418	Francis	May 22, 1917
1,240,137	Hartman	Sept. 11, 1917
1,379,625	Hartman	May 31, 1921
1,900,457	Miller	Mar. 7, 1933
1,970,414	Brown	Aug. 14, 1934
2,240,016	Pinney	Apr. 29, 1941
2,241,169	Yokes	May 6, 1941
2,413,990	Muntz	Jan. 7, 1947
2,535,100	Sourwine	Dec. 26, 1950
2,655,032	Zagray	Oct. 13, 1953

FOREIGN PATENTS

17,775	Great Britain	of 1912
136,257	Great Britain	Dec. 11, 1919
685,157	Great Britain	Dec. 31, 1952
402,971	France	Sept. 13, 1909
601,207	France	Nov. 26, 1925
987,167	France	Apr. 11, 1951