March 29, 1960 E. R. HAMILTON ET AL 2,930,220

ANCHORING STRUCTURE FOR BUILDING SLABS

Filed May 31, 1955

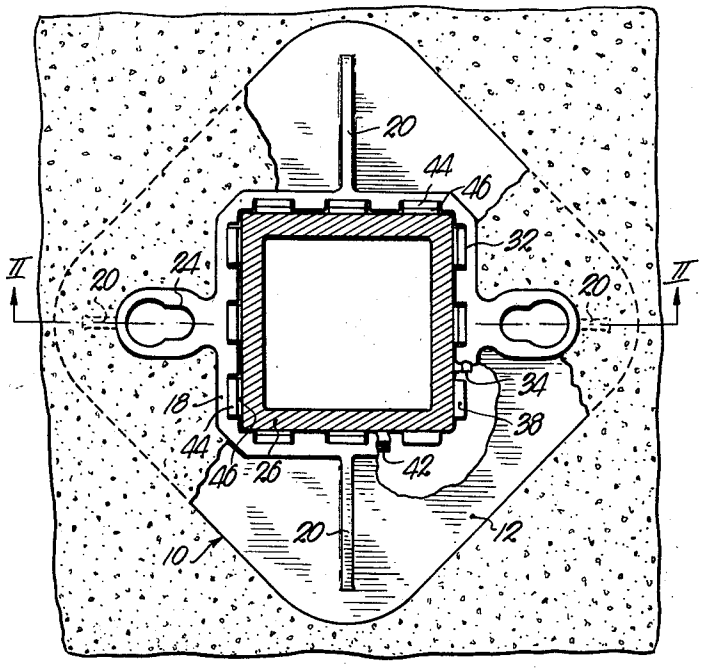


Fig. 1.

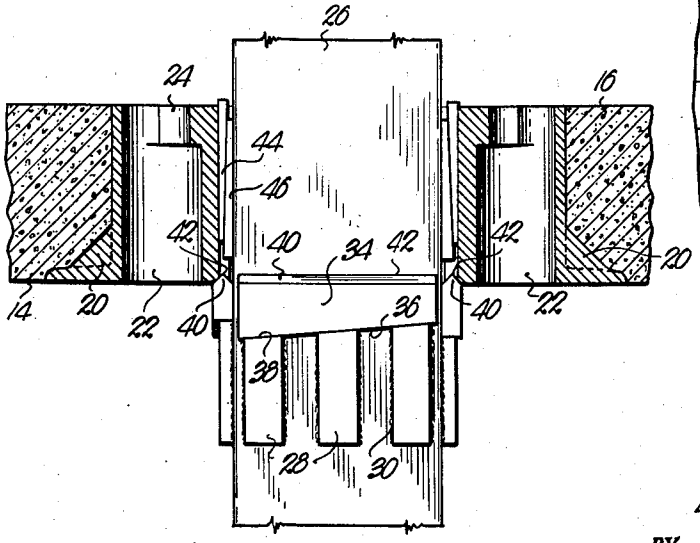


Fig. 2.

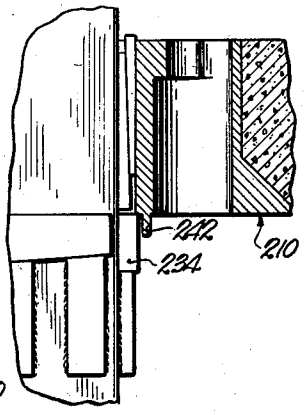


Fig. 3.

INVENTORS.
Edward R. Hamilton
Carl T. Fornstrom
BY
Carl Hovey
ATTORNEY.

United States Patent Office 2,930,220
Patented Mar. 29, 1960

2,930,220

ANCHORING STRUCTURE FOR BUILDING SLABS

Edward R. Hamilton, Austin, Tex., and Carl T. Fornstrom, Pacific Palisades, Calif., assignors to United States Lift Slab Corporation, Austin, Tex., a corporation of Delaware

Application May 31, 1955, Serial No. 512,266

5 Claims. (Cl. 72—1)

This invention relates to an apparatus wherein a building slab is anchored to a supporting column therefor, through the medium of abutments on the columns and wedges interposed between the abutments and lifting collars forming a part of the slabs, together with wedge means between the collars and the columns for holding the slabs and columns against relative lateral movement.

In a copending application bearing Serial No. 179,024, filed August 12, 1950, now U.S. Patent 2,758,467, issued August 14, 1956, there is described a building method and apparatus wherein ceiling or roof slabs of a building are formed or poured at one level and then raised to another level. Normally, a base or foundation slab is poured first with vertical columns set therein as described in U.S. Letters Patent No. 2,686,420, issued August 17, 1954. An upper floor, roof or ceiling slab is then poured at ground level on top of the foundation slab and around the vertical columns which are to support the slabs.

These columns or some of them, carry at their upper ends suitable lifting means, the latter being connected to the slab to be raised by lifting or tension rods. The slabs are normally cast from concrete or some similar material requiring reinforcement at the points where the lifting process imposes considerable stress. Thus, collars are cast into the slab in slidable engagement with the vertical columns, such collars serving the combined purpose of reinforcing the concrete providing means of fastening the slab to the columns when the slab has been raised to the proper position providing an efficient securement of the tension rods to the slab and providing a protective collar between the slab and the columns.

It has heretofore been the practice in carrying out the method set forth in the aforementioned patent and the said copending application to attach the supporting blocks, brackets or the like as by welding to the columns after the slab to be anchored to the columns has been raised to an appointed level. And, as suggested by Patent No. 2,686,420, to provide blocks between the collars and the proximal faces of the columns.

Such procedures of applying supporting brackets or the like to the vertical surfaces of the columns where the operators must work on scaffolding, ladders and the like, is most difficult, time-consuming and expensive. In accordance with the principles of the instant invention therefore, such difficulties and hazards are eliminated by placement of the aforementioned abutments upon the columns before the same are raised to the vertical position, and the collars, as well as the wedges for anchoring the collars to the columns are modified accordingly.

In an early Patent No. 1,066,436, issued July 1, 1913, there is suggested the principle of insertion of sectional brackets or shoulders between the slab and outturned flanges at the median ends of the column sections. The suggestions of this patent are unsatisfactory however, because collars are not maintained in sliding engagement with the columns and, therefore, are unsupported during the raising operation, because the sectional brackets fail to compensate for irregularities in the distances between the slabs and the flanges, and because of several other factors hereinafter to be made clear.

It is the most important object of the instant invention, therefore, to provide anchoring structure for building slabs that is safe not only during the lifting operations, but while the slab is being anchored to the columns and throughout the life of the building employing the same.

Another important object of this invention is to provide anchor means which is easily and quickly applied, thereby eliminating the expense, loss of time and danger incident to methods heretofore employed in this field.

A further object of this invention is to provide apparatus that is strong, durable and fully capable of anchoring the slab to the columns without danger of displacement.

A still further object of the invention is to provide means for making minor height adjustment of the slab at a particular column by placing of the securing wedges between abutments on a column and the collar of the slab.

Other objects include important details of construction, all of which will be made clear as the folowing specification progresses, reference being had to the accompanying drawing wherein:

Figure 1 is a cross-sectional view through a vertical column showing a slab broken away to illustrate one of its collars in plan and illustrating anchoring structure made pursuant to the present invention.

Fig. 2 is a fragmentary, cross-sectional view taken on line II—II of Fig. 1; and

Fig. 3 is a cross-sectional view similar to Fig. 2 showing another embodiment of the instant invention.

Except for certain important details of construction to be hereinafter set forth, the particular nature of the collar employed in connection with the anchor structure illustrated in the drawing, is of no consequence and, therefore, there is shown a collar broadly designated by the numeral **10** and having the same general characteristics as that disclosed in a copending application Serial No. 305,722, filed August 22, 1952, now abandoned.

It consists of a base plate or flange **12** which normally lies in the plane of the bottom **14** of a concrete slab **16** within which the collars **10** are cast, but in some cases the plate **12** may advantageously be positioned above the lowermost surface **14** of the slab **16**. Plate **12** is joined to, or forms a part of, a sleeve **18** at the lowermost edge of the latter and in order to provide additional strength, a number of structural supports or gussets **20** may be placed around the outer surface of the sleeve **18** and the upper face of the plate **12**.

A pair of outwardly extending tubes **22**, preferably formed integrally with the plate **12** and with the sleeve **18**, are provided with keyhole slots **24** which receive tension or lifting rods (not shown) provided with heads that are received within the tubular elements **22**. It may be pointed out that such lifting rods depend from lifting jacks supported at the uppermost end of each vertical column **26** respectively in much the same manner as disclosed in Patent 2,686,420, wherein but one lifting screw is employed for each column respectively. As the jacks are simultaneously actuated, the slab **16** is raised along the plurality of vertical columns **26** as the collars **10**, and particularly the sleeves **18**, slide along the columns **26**.

The lifting apparatus and method set forth in application Serial No. 179,024 above-mentioned, forms no part of the instant invention and, therefore, reference may be had to Patent No. 2,686,420 for a general understanding of the nature thereof. It is to be pointed out at this juncture additionally, that, while columns **26** chosen for illustration of the principles of the instant invention are polygonal in transverse cross-section, the shape thereof is of

no consequence since the novel anchoring structure illustrated in the drawing may be employed in connection with other types of columns and collars.

Prior to raising the columns **26** and supporting the same in a vertical position to receive the slabs **16**, at least one pair of opposed, outer faces of the column **26** is provided with a plurality of abutments **28** which may be easily, quickly and satisfactorily attached thereto by welding, as indicated at **30**. In order to assure that the sleeves **18** remain in sliding engagement with the outer surfaces of the columns **26**, it is necessary to provide clearance for the abutments **28** and, therefore, the walls forming sleeve **18** are provided with a clearance opening **32** for each abutment **28** respectively.

After the slab **16** is raised to its appointed level above the abutments **28**, and while the slab is being supported by each of the jacks at the uppermost ends of the columns through use of the aforementioned lifting rods connected within the tubular elements **22**, members **34** are inserted or driven into place between the lowermost face of the collar **10** and the uppermost ends of the abutments **28**. Inasmuch as the column **26** and the sleeve **18** are each provided with four sides, there is illustrated a plurality of abutments **18** on each of the four faces of the column **26** and accordingly, four members **34** will be employed in the manner shown in Figs. 1 and 2 of the drawing.

The members **28** and **34** are in the nature of co-acting wedges by virtue of the fact that the lowermost edge **36** of the members **34** are inclined and the uppermost ends **38** of the abutments **28** likewise slope downwardly toward one corner of the column **26**. The uppermost edges **40** of the wedges **34** bear flatly against the lowermost face of the collar **10** however, and by virtue of such construction there is provided a tight fit for the wedges **34** between the abutments **28** and the collars **10** whether or not the slab **16** is in a truly horizontal position at the time of anchoring the same to the columns **26**. By these wedges **34** acting on the abutments **28** and on the collars there is provided a minor height adjustment for the slab. This is an important feature in making minor level adjustments of the slab **14**.

It is to be noted that the wedges **34** traverse the lowermost open ends of the clearance passages or openings **32** and in order to avoid any possibility of displacement of the wedges **34** from the wedge-like abutments **28**, the collar **10** is provided with grooves **42** in the lowermost face thereof for receiving the uppermost edges **40** of the corresponding wedges **34**. While the edges **40** and the co-operating grooves **42** are illustrated in Fig. 2 as V-shaped, the contour thereof may be varied as desired.

While it is absolutely essential that the sleeves **18** remain in substantial sliding engagement with the columns **26** from a safety standpoint throughout the time the slabs **16** are lifted from the ground level to the point of anchoring, slight clearance must be provided as seen in Fig. 1 to allow for imperfections in dimensions and therefore, in order to eliminate any lateral movement of the slab **16** relative to the columns **26**, the passages **32** should be filled with grout or other material, and in this respect it is to be preferred that a pair of coacting wedges **44** and **46** be driven into place within each passage **32** respectively in tight engagement not only with the faces of the columns **26**, but with the sleeves **18**.

Another manner of accomplishing the desired result is illustrated in the embodiment of Fig. 3 of the drawing and wherein wedges **234** are held against lateral displacement through the medium of extensions or flanges **242** depending from the collar **210** in overlapping relationship to the outermost faces of the wedge members **234**.

While but one column **26** has been illustrated in the drawing, it is to be understood of course, that the same anchoring structure is to be employed for each of the plurality of columns utilized in supporting the series of superimposed slabs **16** forming the various floor levels

of the finished building. Each slab **16** is provided with a collar cast therewithin for each column **26** respectively and, therefore, when the relatively large number of anchoring structures hereinabove described are utilized for each slab respectively, there is no possibility whatsoever of accidental displacement or sagging and all hazards, as well as aggravating time and expense in attaching the slabs to the columns are eliminated through employment of the principles hereinabove set forth.

It is now clear also that the above-described improvements solve the problem of attachment of the slabs to concrete columns since it is but necessary to mount the abutments **28** on cross members traversing the concrete columns and embedded therein.

Having thus described the invention what is claimed as new and desired to be secured by Letters Patent is:

1. In a building structure the combination comprising a vertical support column having an abutment thereon and a gradual inclined upper surface extending generally tangentially to a side surface portion of said column, a slab, a collar embedded in the horizontal slab, said collar slidable into position along said column and over said abutment thereon, and a support in the form of a wedge member inserted between said inclined surface on said abutment and said collar to transfer the load of said slab at said column through said embedded collar to said abutment, said wedge member when moved cooperating with said abutment surface and said collar to permit minor height adjustments of said collar and slab with respect to said abutment along said column.

2. In a building structure the combination according to claim 1 wherein said collar has a horizontal bottom face above said inclined surface on the abutment and said wedge member positioned between said collar and abutment has a horizontal top surface and an inclined lower surface of like incline to said incline on the abutment, said wedge member acting as a wedge to effect minor adjustments in height of said collar and slab and to transmit the load of said slab at the column through said collar to said inclined surface on said abutment.

3. In a building structure the combination according to claim 2 wherein said collar above said abutment is formed with a groove and said wedge member has an upper projecting edge received in said groove whereby said support member is locked in place.

4. In a building structure the combination according to claim 2 wherein said collar above said wedge member has an offset flange depending in spaced relation to said column, said depending flange portion extending downwardly alongside the outside of the upper portion of said wedge member and holding said wedge member in place.

5. In a building structure the combination according to claim 2 wherein said collar is also formed with a second vertically extending recess open on one side adjacent said column, said second recess receiving a pair of vertically extending and cooperating wedge members drivable against each other to form a tight fit between column and collar.

References Cited in the file of this patent

UNITED STATES PATENTS

341,639	Clark	May 11, 1886
844,385	Mommertz	Feb. 19, 1907
1,032,419	Morrill	July 16, 1912
1,066,436	Peltzer	July 1, 1913
1,076,588	Lemirand	Oct. 21, 1913
1,435,486	Leon et al.	Nov. 14, 1922
1,811,652	Schuh	June 23, 1931
2,540,679	Laffaille	Feb. 6, 1951
2,572,928	Hawes	Oct. 30, 1951
2,686,420	Youtz	Aug. 17, 1954
2,715,013	Slick	Aug. 9, 1955

FOREIGN PATENTS

705,825	Great Britain	Mar. 17, 1954