May 2, 1961 G. H. REVESZ ET AL 2,982,103

METHOD AND APPARATUS FOR UNDERPINNING A BUILDING

Filed Jan. 12, 1959

FIG. 1

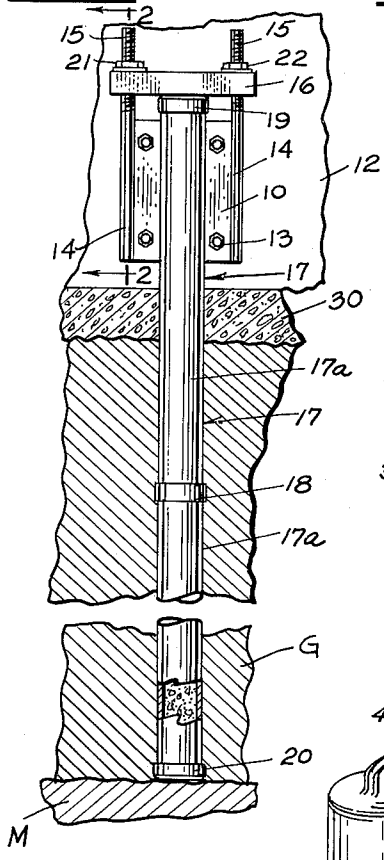


FIG. 4

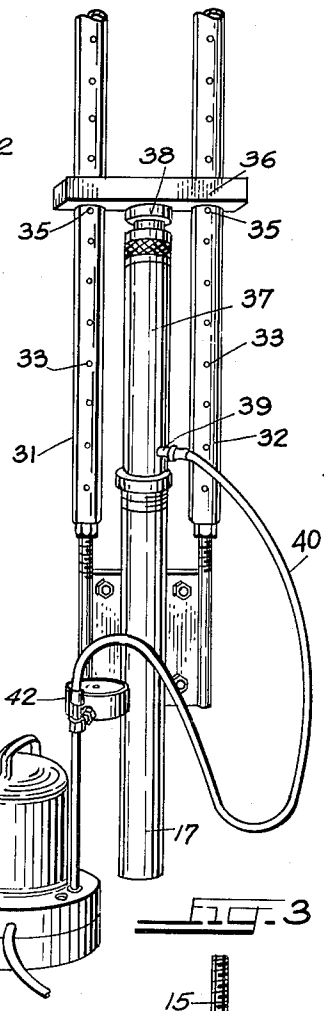


FIG. 5

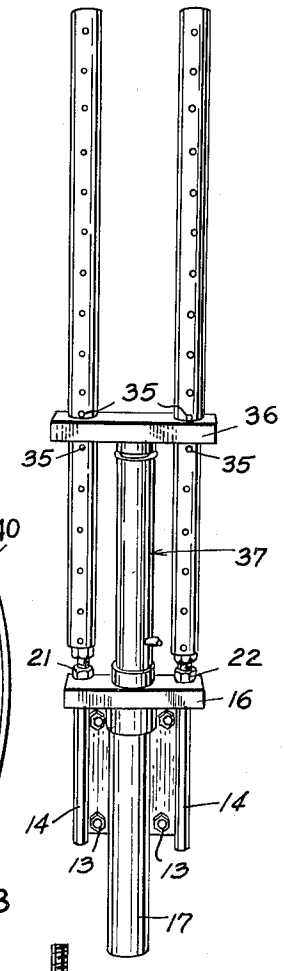


FIG. 2

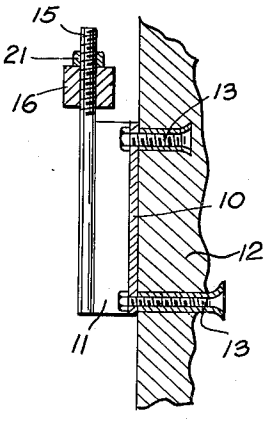
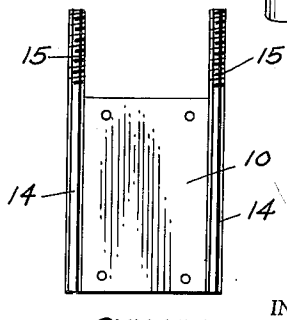


FIG. 3



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METHOD AND APPARATUS FOR UNDERPINNING A BUILDING

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This invention relates to preventing building settlement, and more particularly to the method and apparatus for underpinning a building in which the building load is transferred to a supporting structure to prevent further settlement.

A feature of this invention is to provide a structure which may be easity attached to a building and which provides a firm support for a jack mechanism to drive a pipe into the ground beneath the building to a depth to engage a firm bearing material and which also supports structure for interconnecting the pipe to the building whereby a building load is supported by the pipe to prevent further settlement of the building.

Another feature of the invention is to provide a method of underpinning a building to prevent settlement thereof comprising the steps of: attaching a wall bracket to the building, driving a length of pipe into the ground to have a pipe length extending from good bearing material to the location of said bracket, establishing a predetermined load on said pipe, and securing the wall bracket to the pipe while maintaining the predetermined load on the pipe whereby the building has a predetermined part of its weight transferred to said pipe.

The invention is illustrated in the accompanying drawings in which:

Fig. 1 is a front elevational view showing the building underpinning structure in final association with the building with parts broken away;

Fig. 2 is a vertical section taken generally along the line 2—2 in Fig. 1;

Fig. 3 is a detail front elevational view of the wall bracket attachable to a building;

Fig. 4 is a perspective front elevational view showing the apparatus, including the jack mechanism, for driving pipe into the ground beneath a building, looking toward the mechanism generally at the level of the jack mechanism; and

Fig. 5 is a perspective elevational view looking toward the structure slightly above the midpoint thereof and is a view showing the structure and a step in the method subsequent to that shown in Fig. 4 in which the wall bracket is interconnected to the pipe length through a load plate.

Referring to the drawings in more detail, the final structure for transferring part of a building load to an underpinning structure, as shown in Fig. 1, in which a wall plate 10 having a generally rectangular shape is provided with a pair of spaced apart outwardly extending side flanges, one of which is shown at 11. The plate 10 is securely fastened to the foundation wall 12 of a building by a plurality of threaded members, such as bolts 13. As illustrated in the drawings, the plate 10 is attached to the inner side of the foundation wall, although the attachment may be to the outside of the wall in any situation wherein such attachment is found to be desirable or necessary.

The plate flanges, one of which is shown at 11, each support a bolt member 14 and these members each have

their upper ends threaded, as indicated at 15. The members 14 are secured to the plate flanges to provide a rigid connection therebetween, and such attachment may be accomplished by welding the parts together.

An apertured load plate 16 spans the distance between the members 14 and fits on said members by the apertures being placed thereover and engages the top of a length of pipe, indicated generally at 17. The pipe 17 constitutes an underpin and comprises a series of pipe sections 17*a*, each approximately four feet long, with adjacent sections joined by a coupling member 18. The pipe 17 is composed of sufficient pipe sections 17*a* and couplings 18 whereby the pipe will reach to a depth in the ground sufficient to reach good bearing material and have its upper end disposed adjacent the wall bracket plate 10. In Fig. 1, the ground is indicated generally at G, and the hard bearing material is indicated at M. The pipe is filled with a cement grout and has its upper and lower ends capped by caps 19 and 20.

The load plate 16 is securely attached to the wall bracket plate 10 by means of a pair of nuts 21 and 22 threadably secured to the threaded ends 15 of the bolt members 14.

With the structure shown in Fig. 1, the building foundation wall, through the wall bracket plate 10, is rigidly supported upon the pipe 17 through the load plate 16 secured to the threaded ends 15 of the members 14.

Although a single building underpin support is disclosed in Fig. 1, a sufficient number of these units may be used to adequately support the load of the building and prevent further settlement thereof.

The method of underpinning the building resulting in the assembly shown in Figs. 1, 2 and 3, comprises the following series of steps. Initially, a soil test is obtained to determine the depth beneath the building of good hard bearing material and an architect or engineer then determines where the pipe underpins should go and what number of underpins should be used to adequately support the building.

Reference is now made to the method of providing a single pipe underpin and the following steps would be duplicated with each additional underpin utilized.

The wall bracket plate 10 is attached to the building wall 12 at a distance above a floor 30. A hole is then drilled through the floor and foundation footing of a diameter sufficient to receive the pipe 17. This hole through the floor and footing may be made with a "core" drill having diamond bits to go through the concrete.

The next steps are then illustrated in Fig. 4 of the drawings in which a pair of posts 31 and 32 are threadably attached to the upper ends of the respective bolt members 14 on the wall plate. These posts are each provided with a series of openings 33 to receive pins 35 extending therethrough which engage above and beneath a brace 36 spanning the distance between said posts and apertured to slidably fit thereon. After securing the brace to the posts 31 and 32, a hydraulic jack 37 is attached to the brace 36 by means of a bracket 38. The jack has a fluid inlet 39 connected by a line 40 to a fluid pump 41. A pressure gauge 42 is placed in the line 40 to provide pressure readings. Successive pipe lengths 17*a* are then driven into the ground by the jack 37 until the predetermined depth of pipe is obtained to have the pipe reach the bearing material M. Each of the pipe sections 17*a*, after being driven down to a position to have its upper end positioned above the footing or floor, has a succeeding pipe section attached thereto by a coupling 18 to provide a continuous pipe length.

After the desired length of pipe 17 is driven into the ground and extends above plate flanges 11, the jack 37 as well as the posts 31 and 32 are removed from

the members 14. The load plate 16, as shown in Fig. 5, is then placed on the threaded ends 15 of the members 14 and the nuts 21 and 22 are placed above the load plate 16 and on threaded ends 15. The posts 31 and 32 are then again threadably attached to the members 14 and have the brace 36 secured thereto. The jack 37 is then positioned between the brace 36 and the load plate 16, and the fluid pump 41 is operated to build up a pressure in the jack mechanism approximately equal to a pressure up to 50% greater than the pressure needed to support the weight that each unit is designed to carry, to pretest the pipe positioning on good bearing material. With the pretest pressure indicated on the gauge, the load of the structure is then transferred to the pipe. This presetting of the load provides a controlled load on the pipe 17, and when a plurality of underpins is made for a building, spreads the load between each of the underpins and prevents too much load on any one. This presetting of the load also tends to preclude further settlement of the building.

With the jack built up to the pretest pressure, as described above, a wrench is then applied to rotate the nuts 21 and 22 to move the load plate 16 downwardly as shown in Fig. 5, while maintaining the predetermined load on the pipe 17. This downward movement of the load plate 16 due to tightening of the nuts is continued until the pressure gauge 42 goes to a zero reading to indicate complete transfer of load. Prior to the operation shown in Fig. 5, and particularly in the placement of the load plate 16 on the wall bracket 10, the pipe 17 will be filled with the cement grout and the top cap 19 placed on the pipe 17.

The foregoing detailed description is given for clearness of understanding only, and no unnecessary limitations should be understood therefrom, as modifications will be obvious to those skilled in the art.

We claim:

1. The method of underpinning a building to support the weight thereof and prevent settlement thereof comprising, attaching a series of wall brackets on a building foundation in spaced apart relation to generally equally support a desired building load, driving a series of interconnected pipe sections for each bracket into the ground beneath the building until the length of pipe section reaches a desired depth in the ground by jack mechanism supported on the associated bracket, connecting a length of interconnected pipe sections with a bracket, and placing a predetermined load on each of said brackets to obtain a controlled load on each length of pipe representing a part of the building load.

2. A building underpinning structure comprising, a bracket having a generally rectangular plate, means securing the bracket plate to the foundation wall of a building, a pair of spaced members attached to said bracket plate and having their upper ends threaded and extending upwardly beyond the upper edge of said bracket plate, a load plate of a length to span said members and having a pair of apertures to receive said members with an intermediate section free to engage the end of a pipe driven into the ground, and nut means on said threaded ends rigidly interconnecting said load plate and said members to transfer a load from the building to the pipe through said bracket and load plate.

3. A building underpinning structure comprising, a bracket, means securing the bracket to the foundation wall of a building, a pair of spaced members attached to said bracket and having their upper ends extending upwardly beyond the upper edge of said bracket, a load bracket of a length to span said members and having a pair of apertures to receive said members with an intermediate section free to engage the end of a pipe driven into the ground, and means rigidly interconnecting said load plate and said members to transfer a load from the building to the pipe through said bracket and load plate.

4. A building underpinning structure for driving interconnected pipe lengths into the ground and supporting the building on said pipe lengths comprising, a bracket having a base, means securing the bracket to a building foundation, a pair of spaced threaded members on said bracket spaced from said base with their upper threaded ends positioned above the base, a pair of elongated posts threadably attachable one to each of said members, a brace interconnectable with said posts to support a jack member adapted to drive interconnected pipe lengths into the ground beneath the building, a load plate engageable with the pipe sections, and means for rigidly connecting the load plate to said threaded members whereby the building is supported on the length of pipe through the bracket.

5. The method of underpinning a building to support the weight thereof and prevent settlement thereof comprising, attaching a series of wall brackets on a building foundation in spaced apart relation to generally equally support a desired building load, driving a series of interconnected pipe sections for each bracket into the ground beneath the building until the length of pipe section reaches a desired depth in the ground by jack mechanism supported on the associated bracket, hydraulically placing a preload on each of said brackets, detecting the presence of a predetermined preload to obtain a controlled load on each length of pipe, and connecting a length of interconnected pipe sections with a bracket with the predetermined preload maintained on the bracket.

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