No. 844,296. PATENTED FEB. 12, 1907.

E. J. WINSLOW.

BUILDING CONSTRUCTION.

APPLICATION FILED OCT. 20, 1905.

3 SHEETS—SHEET 1.

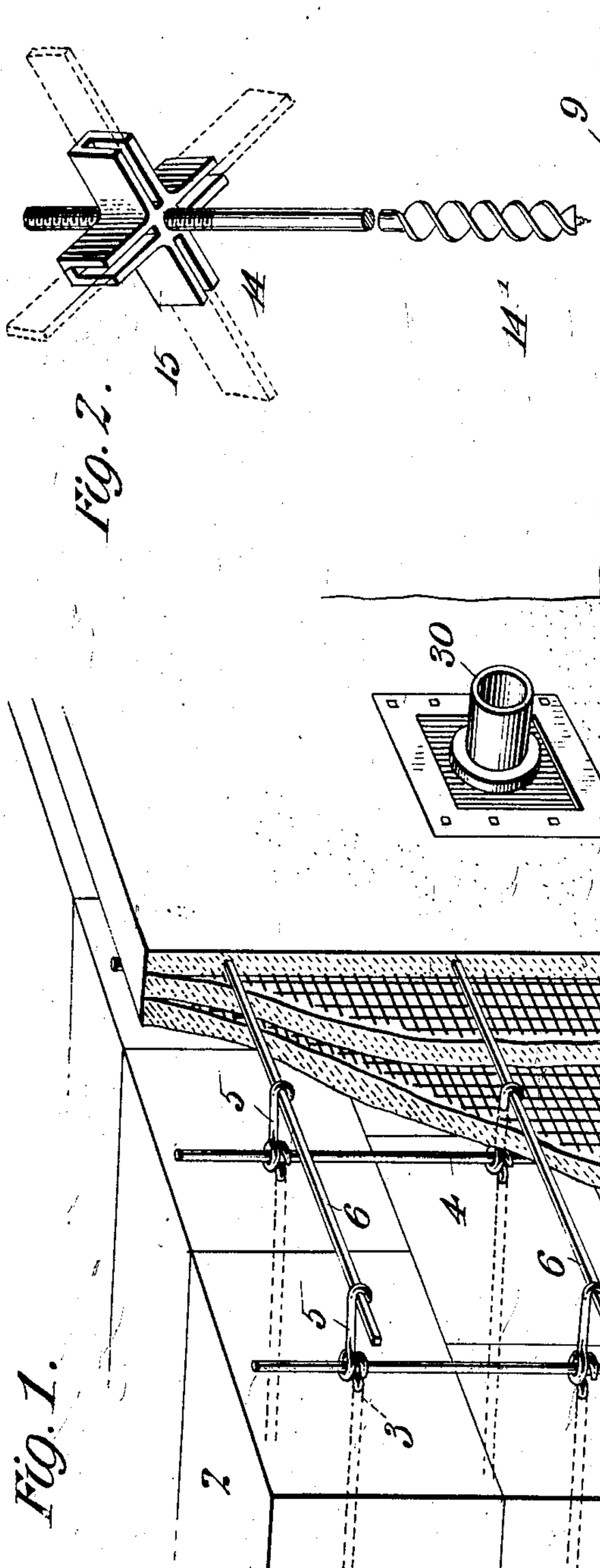

Fig. 2.

Fig. 1.

Witnesses

Inventor:
E. J. WINSLOW

By his Attorney Albert Nathan

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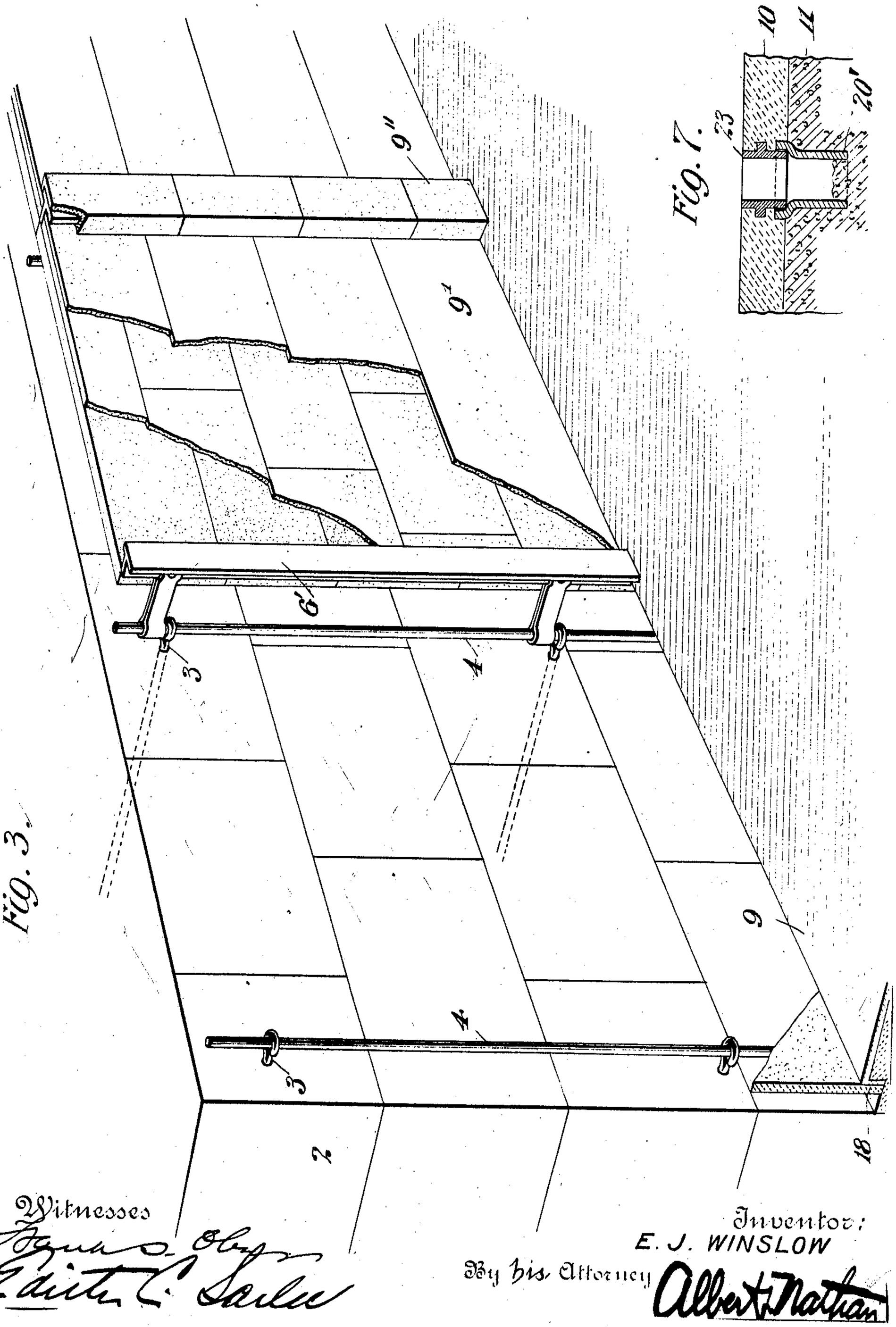

Fig. 3.

Fig. 7.

Witnesses
Edith L. Sadler

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3 SHEETS—SHEET 3.

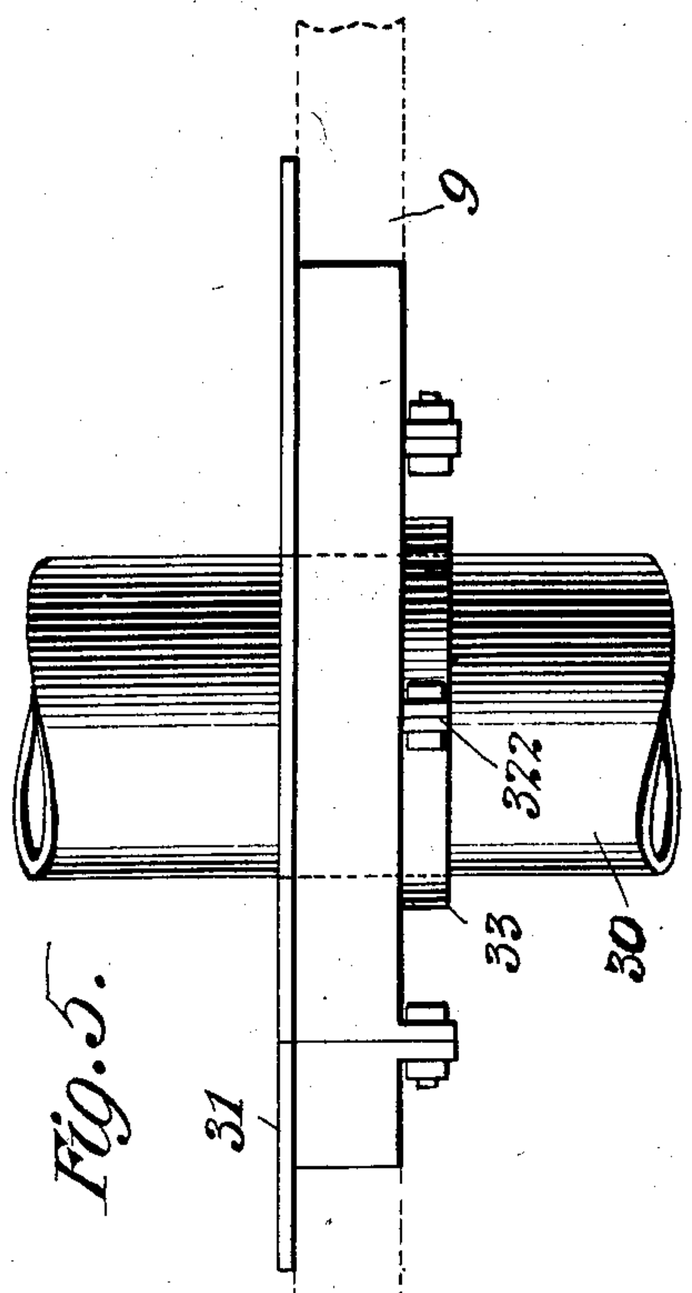

Fig. 5.

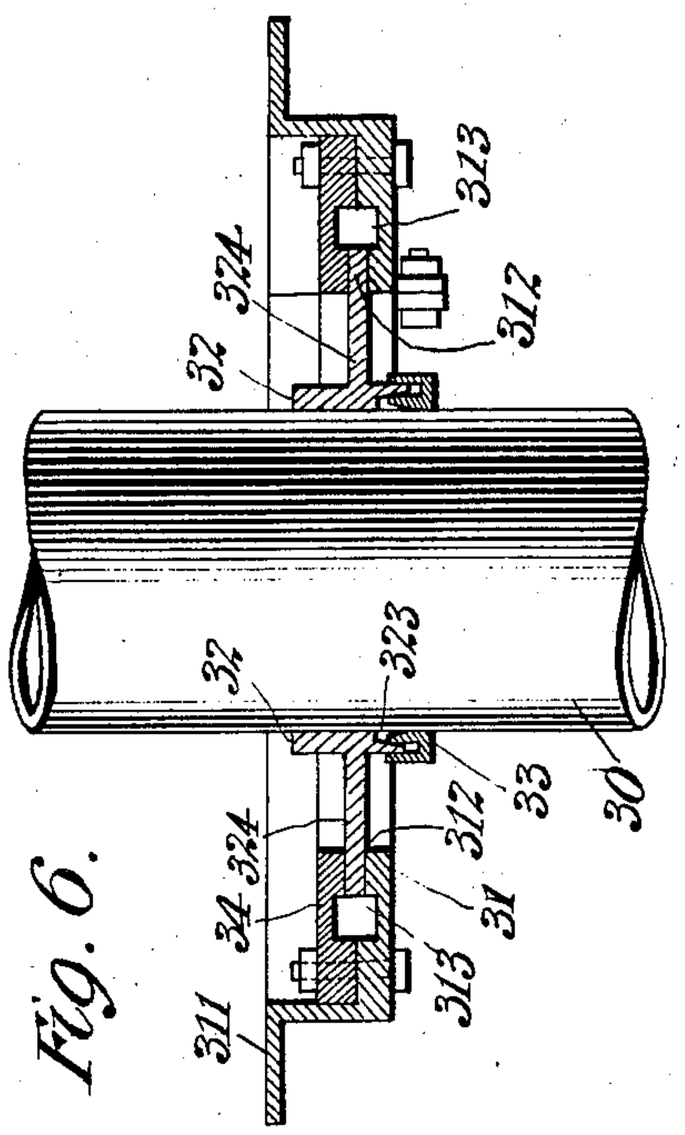

Fig. 6.

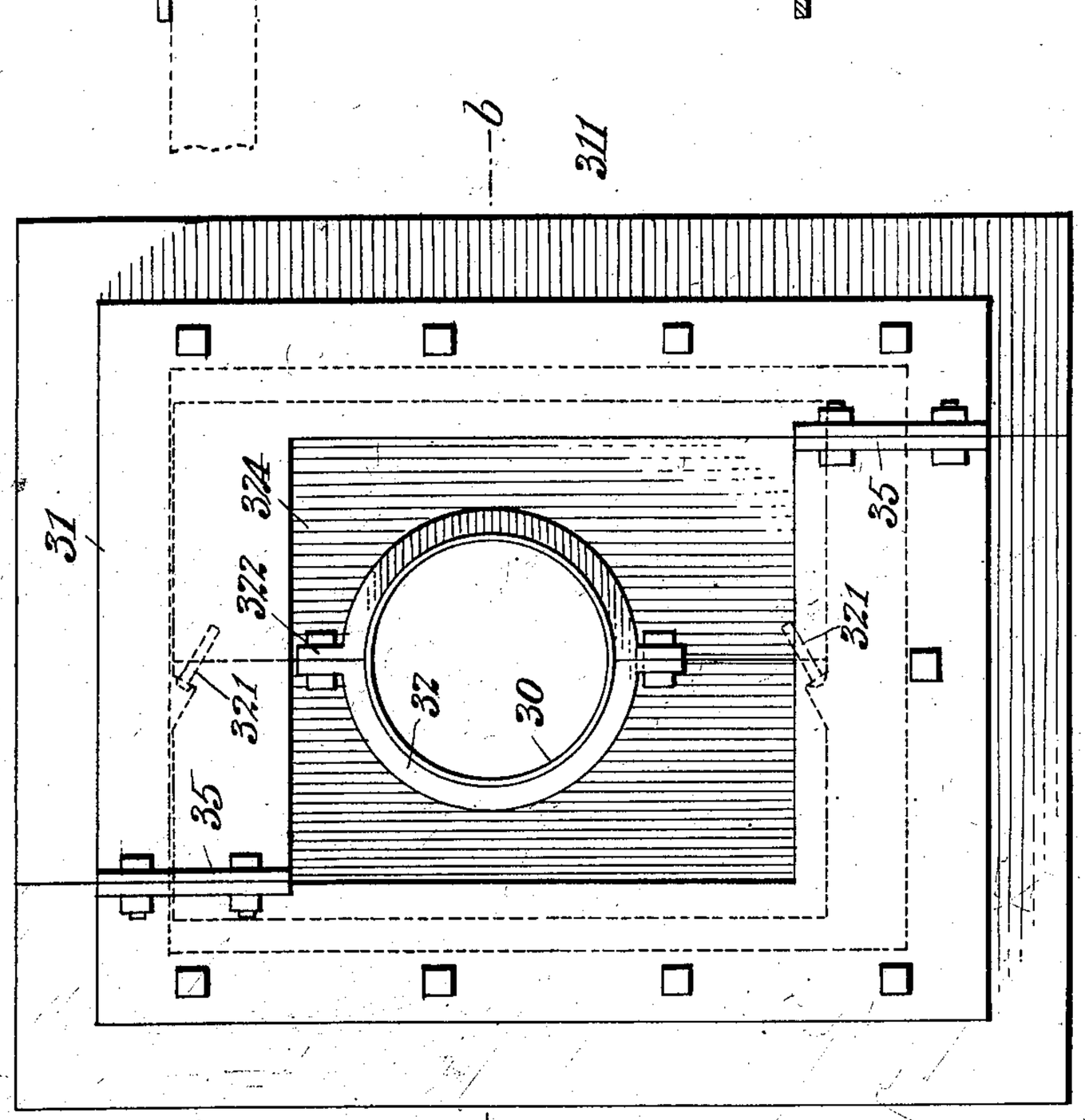

Fig. 4.

Witnesses

Inventor:
E. J. WINSLOW,

By his Attorney

UNITED STATES PATENT OFFICE.

EDWARD JARVIS WINSLOW, OF CHICAGO, ILLINOIS.

BUILDING CONSTRUCTION.

No. 844,296. Specification of Letters Patent. Patented Feb. 12, 1907.

Application filed October 20, 1905. Serial No. 283,584.

To all whom it may concern:

Be it known that EDWARD JARVIS WINSLOW, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, has invented certain new and useful Improvements in Building Constructions, of which the following is a specification.

This invention relates to improvements in building constructions whereby the same is rendered resistant to hydrostatic pressure, impervious to moisture, and sufficiently yielding to accommodate itself to all usual or ordinary settling. More specifically, the invention relates to an integral impervious shell for lining an excavation, so as to render the chamber thereby created thoroughly waterproof, such shell being so placed and affixed within said excavation as to permit the latter to undergo a very considerable warping, settling, or other distortion without injury to the imperviousness of the shell.

Still more specifically, this invention refers to an adaptation of such shell as will provide for readily draining from the same water accumulated therein by accident or inadvertence, and which will, moreover, afford a means for accommodating a relative movement of elements of construction—such as pillars, pipes, girders, or the like—as may necessarily pass therethrough. In subterranean or subaqueous waterproof structures such as have hitherto obtained it has been found, owing to the distortions resulting from a settling of the foundations, that cracks and fissures would develop in the impervious walls, which are usually of brittle and inelastic material, and, furthermore, that when such waterproof floors or walls are made only so thick as to insure their imperviousness they are lacking in sufficient strength to withstand the pressure caused by appreciable heads of water.

Broadly speaking, this invention has a twofold object, being designed, on the one hand, to provide a structure such as will allow of a very considerable settling of foundations without producing any damage to the homogeneity of the brittle waterproof coating forming a part thereof and, on the other hand, to produce a construction whereby such impervious coating may be made of a minimum thickness and yet by a mode of anchoring the same to the adjacent groundwork to produce a structure such as will effectively resist any head of water-pressure that can possibly occur.

It will be noted that the weight of buildings is carried by the walls of the foundation, which, being under ground, have to be waterproof, and when this is done through the use of plastic and other material by direct application to the foundation-wall surface it is found that in most instances cracks or fissures will gradually develop in such wall-surface on account of the uneven settlings of the buildings, and, as will be apparent, these ruptures at once destroy the utility of the applied waterproof coating. I have, however, in the herein-described invention devised a means of flexibly uniting the pipe to the waterproof wall so as to permit considerable relative displacement of the parts without in any way lessening its imperviousness to the flow of fluid, even in cases where the latter is under a very high head.

With these and other ends in view my invention consists in the combinations, parts, associations, and arrangements hereinafter more specifically set forth, by way of example, in denoting how my invention may be embodied into a structure distinguished by ease of erection, economy in materials employed, and efficiency and durability in use.

That this invention may be more fully understood and made comprehensible to others skilled in the arts to which it generally and particularly relates, I have appended as part of this specification drawings showing an embodiment of the same, and while the underlying principle of the invention may be otherwise applied to modifications falling within the scope of the claims the hereinstated form is that I prefer to employ in practice, and now, upon referring to such drawings by means of reference-letters, it will be noted that like characters denote corresponding views throughout all of the figures, of which—

Figure 1 is a view in sectional perspective illustrating one embodiment of my invention and showing specifically the manner of anchoring the floor of the integral shield to the underlying soil, the manner of flexibly attaching the side wall of such shield to the foundation-wall, so as to provide for a settling of the latter without having any deleterious effect upon the former, and showing, furthermore, other features of construction, such as a means of draining the shield and the mode of providing for a free water-tight movement of elements of construction passing through the side wall. Fig. 2 is a detail taken in per-

spective and illustrating specifically a modified form of anchor-bolt heads with its means of attachment to the horizontal base-bars. Fig. 3 is a view in sectional perspective showing a modified side-wall construction of my impervious integral shield, in which I utilize a series of overlapping performed impervious plastic plates. Fig. 4 is a detail showing in plan the arrangement of the side walls so as to allow the various elements of construction passing through the side walls of my shield to have a very considerable lateral play. Fig. 5 is a top view of Fig. 4, having indicated thereon in dotted lines the impervious wall to which the construction here illustrated is affixed. Fig. 6 is a cross-sectional view taken along line *a b* of Fig. 4. Fig. 7 is a cross-section of an improved sump construction, in which a member 20′, which may be a sewer-pipe, is surrounded by a porous granular bed 11 for allowing water to seep from under the floor into the sewer-pipe and sump.

Since in the conditions usually prevailing in subconstruction work the surrounding walls and floors of earth are either objectionably moist or are saturated with freely-flowing water, it is highly essential that some means be taken to guard against such moisture and prevent it from such flow, else the cellar will either fill with water or be so humid as to be unfit for the purposes and uses intended.

I have designated by 2 the foundation-walls, which are usually of masonry, but may be of any preferred material, as this invention is designed to be applicable to any and all forms of foundation-work such as would be likely to obtain in practice. It will be readily understood that such foundation-walls, even when very substantially constructed, will generally leak or exude a very considerable amount of water. At best such walls are more or less of a hydroscopic nature and, as a consequence, the surface thereof is objectionably covered with a film of moisture. Even in instances where such walls are initially so perfectly constructed that no leakage can possibly occur therethrough the water will frequently find entrance into the cellar through the flooring, even in many of the prevailing modes of waterproofing the latter, as it is very difficult to make a perfect joint that will be permanent between the side wall and the waterproof flooring on account of the circumstance that although initially such construction may be perfect a very slight settling of the side walls carrying the weight of the building will suffice to rupture the union, so that leakage will occur, and such settling will, furthermore, so crack such side walls as to render them wholly useless as a waterproofing. It is for this purpose that I prefer to line excavations with a sort of integral shield having a waterproof construction. Such shell or shield by my improved construction permits of being made with thin walls, and therefore a very high grade of material may be employed without causing an undue expense. To resist face-pressures, such as will usually arise from the hydrostatic pressure of accumulated water, I embody in this invention a means for retaining such thin wall against displacement. Such means affords considerable flexibility laterally, so that a very considerable amount of displacement of the side walls, obtained by the settling of the foundations, will not crack the facing. This feature of my invention consists, essentially, in a yielding union between such wall and facing, which union, however, is sufficiently rigid to satisfy the requirements of a practical means of effectively affixing and maintaining the waterproofing in place. Broadly speaking, such union consists in vertically-extending anchor-rods slidably affixed to the groundwork, so as to be slightly spaced away from the surface thereof, and to such rods is attached the waterproofing facing, which in practice is generally more or less brittle, the attachment being done through the use of protruding tie-bolts, which tie-bolts engage with said vertically-extending rods, so as to be capable of sliding therealong. In practice I attain these ends by means of a series of eyebolts 3, which normally extend into and are permanently affixed within the foundation-walls in any suitable manner. It will be noted, however, that the ends of such eyebolts protrude slightly beyond the face of the wall. Rods 4 pass through the eyes of such bolts, thereby being affixed in a plane at a slight distance from the face of the foundation-wall. I have shown such rods 4 as running in a vertical direction; but I do not limit myself to any disposition of this nature, as the object of this arrangement is to provide against the usual direction of settling, which in some instances may be greatest in an inclined direction, and it would then be preferable to arrange the rods in a corresponding manner whenever such variance can be foreseen. Such rods are also preferably cylindrical in form in order that greater freedom of action be given the attached links. Links, by means of eyes at the end thereof, unite these vertical bars to brace-bars embedded within the substance of the waterproof wall. Such brace-bars have a twofold function in that they not only serve to support and stiffen the thin plastic wall, but also receive and properly distribute any localized stresses had from the connecting-links. Ordinarily such brace-bars will be round or polygonal in cross-section, as shown by 6 in Fig. 1; but bars of other shapes, such as the T-bars illustrated in Fig. 3 by 6′, may be employed. In the ordinary construction shown by Fig. 1 such brace-rods will usually be disposed transversely to the bearing-rods 4, as this in-

sures a better structure and creates a rather more flexible arrangement than when disposed parallel thereto, since thereby the hinging-links 5 constitute a union in the nature of a Hook's joint. The eye of such link, through which passes a bearing-rod 4, is of sufficient size for the rod to freely slide therealong. The link may be formed from a band of metal to constitute the strap 6″, (shown in Fig. 3,) in which case it will slidably encircle the bearing-rod and be pivotally riveted to the intermediate web of the bracing T-iron. As will be easily comprehended, such a union allows of a very considerable displacement between the united parts. An extensive vertical movement, which is the usual direction of settling, may be had by the sliding of the eyebolts along the vertical rods. At the same time a very appreciable movement in other directions may be permitted, owing to the rocker-like connection formed by this eyebolt union, by either keeping the pivot clear of cement or protruding the brace-rod connecting portion beyond the inner face of the waterproof lining. Such wall may be made solely of elastic material and embed the aforesaid brace-rods; but in order, however, that the integrity of such wall may be maintained, even in the presence of considerable stresses, which might tend to disrupt the same, I prefer to form such wall with one or more intermediately-embedded wire networks 7 and 8, respectively. Such network will usually be located behind the cross-bars 6, so that they may assist in equalizing the pressure transmitted therethrough, or the wall may be of a plurality of layers of different courses, combined with any number of preferred materials, arranged as desired.

In building up the lining it will be convenient to utilize a suitable form, which will be set up against the foundation-wall and provided with means for holding the metallic skeleton in place during the application of the plastic cement. Such form may be subsequently withdrawn or may remain permanently in place, as desired, since in the latter case it will be so adapted as to allow of the subsequent settling of the foundation.

In case it becomes necessary to expedite the construction I may resort to the modified arrangement shown by Fig. 3. Essentially such form consists of a multiplicity of preformed slabs 9′, arranged in overlapping relationship and cemented together at contacting faces. These slabs will be kept upright between webs of T-irons 6′, and in order that the latter will be protected against corrosion and present a more sightly appearance the exposed flange of the latter will be surrounded by a series of cover-blocks 9″ of plastic material. Such blocks will be set in place with the joints lapping and securely cemented together, as shown, and, as will be apparent, the lining is capable of rapid assemblage.

Between the facing and backing I may introduce a loose or fibrous filling of any desired material, either to serve as a non-conductor of heat, a water or fire proof composition, or both.

In respect to the floors it will be noted that the settling, if any, will be more uniform than in the case of the side walls. Consequently the flooring may be affixed directly to the underlying groundwork or soil with a view of preventing the upflow of water therethrough. The principal difficulty to be contended with in this connection lies in the fact that when the floor is impervious to the flow of fluids an accumulation of water will result in a very considerable hydrostatic head, which will be sufficient in ordinary cases to heave up and break through the flooring. An attempt to overcome this difficulty has been made heretofore by introducing into the floor construction a great thickness of heavy material, the idea being to have the weight of the latter preponderate over the hydrostatic head of the water; but, as will be readily perceived, such an expedient is very costly in practice and in other ways very unsatisfactory. My system of anchorage is designed so that the thickness of the impervious flooring need not be greater than is absolutely necessary to insure the impermeability of the floor-coating to the flow of water.

It is to be observed that the anchorage means is not intended to form a feature of the waterproofing construction, as this is obtained by means of the cementitious coating, which is anchored securely to the underlying soil. I so anchor this coating by means of a plurality of horizontally-lying bars, which are preferably embedded in the mass of such coating, and these bars I retain in a relatively fixed position in respect to the underlying soil by a series of vertical—that is to say, downwardly - extending—anchor-bolts. Such bolts I prefer to make in general of a spiral-like shape—such, for instance, as the ordinary earth-auger—excepting that the shaving end is omitted, since the function of this modified auger lies solely in affording a means which will enter the earth with considerable facility and be firmly retained therein, and thereby secure the superposed parts against upheavel. Such anchor-bolts, which I have indicated as 14, have their lower ends 14′ flared into a spirally-running flange after the fashion of a wood-screw or earth-auger. The top portion 14″ of such screw is hook-shaped, so as to adapt the same for a firm gripping of the prior-mentioned cross-bars. While this form of tie-bolt will be found to be the simplest and cheapest in construction and use, I do not limit this invention to such, as various modified forms of the same may be resorted to. Thus in Fig. 2 I show the upper end of

the bolt 14 as screw-threaded to a union 15, which is arranged to receive the ends of the cross-rods, as shown. By this form of anchor-bolt I obtain a result which cannot be produced by means of ordinary bolts or staples, as the latter do not provide for becoming clenched into the soil unless special conditions obtain—such, for instance, as when the staple or bolt is made with split ends designed to spread upon contact with some hard deflecting substance.

Suitable brace-rods 16 are provided to distribute the strain of the anchor-bolts throughout the flooring, which with respect to the waterproof portion will be very thin, and as the latter will be constituted mainly of a plastic or cementitious material, will be of little tensile strength and ill adapted, unassisted, to rebut the bending face of a considerable head of water. Such rods will preferably be embedded in a layer 10 of adhesive material, such as a ferro-concrete flooring, which may or may not be further reinforced by a net of wire mesh 17. This layer may be faced with a hard impervious finish 9 of suitable material, such as that known as "hydrolithic." The latter may be spread over the concrete layer as a homogeneous plastic mass or may be applied in lapping plates, as shown by the wall in Fig. 3. Underlying such concrete layer I may introduce suitable foundation material, such as a layer 11 of loose gravel or stone and a layer 12 of concrete, or I may vary the same by employing other materials and arrangements.

The usual manner of building my improved floor will be to first insert the anchor-bolts into the soil to a predetermined depth. Then pass the cross-rods 16 through the eyes of such bolts or otherwise affix them together in a secure union and then build up the plastic floor.

In carrying out the scheme of my invention I unite the floor to the adjacent walls in such a manner that the whole constitutes a water-tight integral shell whose bottom rests directly upon the soil and is affixed thereto, while the side walls are flexibly attached to the foundations of the building in such a fashion as to allow of a considerable play and movement between the two. Such union may be accomplished in the manner shown by 18 in Fig. 3, in which the impervious facings of the wall 9′ and floor 9 are lapped together and bonded by any suitable cementitious material, or the means shown by Fig. 1 may be resorted to. It is desirable, however, that a secure union be made in order that such joint may not subsequently open from some cause or another.

It will be apparent that while the above detailed shell or integral lining will accommodate itself to ordinary shiftings of the surrounding foundations without admitting any water it may at times occur that such shield will become flooded from a variety of causes arising out of unusual conditions, and to aid in pumping out such flood or otherwise draining the cellar I provide an underlying sump-pit and closable manhole therefor. Such sump-pit may either be an open vault suitably braced against collapse, or the same end may be effectively attained by filling such pit with a mass of broken stone, gravel, or the like. The numerous interstices in the latter will accommodate a very considerable amount of water and at the same time effectively prevent any collapse of the vault or pit walls. Frequently the water accumulating in such pit and around the impervious shield will be of an acidulous or corrosive nature, and it is therefore desirable that such manhole or part be constructed so that the parts thereof that are exposed to the action of such water will be of a durable inert material. In order that the cost of such device may be lessened and its effectiveness augmented, I prefer to construct the unexposed portions of iron and the exposed features of some inert composition, such as brass. In practice I generally resort to the embodiment shown in Fig. 1, which comprises a neck or ring 20, of hard-setting plastic material, such as hydrolithite, such neck leading to the underlying vault and preferably integrally uniting with the impervious floor. Embedded within such neck is a cast-iron ring 21, which is provided with small lugs 22, spaced around its exterior for the purpose of securely maintaining such ring against turning. Such ring is protected against corrosion by a brass bushing 23, which extends over its top in a flange flush with the floor-surface. Such bushing 23 is interiorly screw-threaded into union with a brass cap 24, having recesses 25 for engagement with a turn-key or spanner. The floor will preferably be slightly inclined toward such well, which may be opened and drained whenever occasion requires.

I have not explained as yet how I provide for the pipes, beams, guides, columns, and the like, which necessarily pass into or through the aforesaid waterproof structure. Such features are usually so affixed to the building-foundations as to be carried by them in the course of their settling, and consequently some hermetic positionable union between the impervious lining of the shield and the element will be required.

The construction and operation of the positionable connection between the shifting element and wall will be easily understood upon a reference to the drawings, having particular regard for Figs. 4, 5, and 6. Such element (here shown as a pipe) I have designated by 30, the wall being, as before described, distinguished by character 9. It is obvious that the particular formation or con-

struction of such wall has no bearing upon the now-described connection, as the latter is adapted for use with any stiff impervious lining, whether the latter be of plastic material, wood, or other substances commonly employed in the construction of buildings. I provide as a sort of lining to the orifice in this wall an annular face-plate 31, which as I use in this present construction may have a right-angled flange 311, adapting it to a more secure union with the wall, as will be readily seen by inspection of the drawings. Such face-plate may terminate in an inner rim or bearing-surface 312, which extends around the orifice without any break whatever. Circumscribing this rim is preferably a recess or channel 313, which extends entirely around such rim, so as to form an annular pocket for the reception of packing or other substitutes of like nature. It is upon this rim that a flanged collar has a water-tight bearing. Such flanged collar 32 will preferably be made in sections suitably bolted or otherwise affixed together, preferably near its circumference, by means of angularly-extending bolts 321, with their heads countersunk in recesses, as shown, and also at a position adjacent the periphery of the pipe by collars having the usual tightening-lugs 322. Adjacent the pipe the collar is preferably extended into a funnel-shaped ring 323, which by coacting with an annular angular cap 33 affords a means of readily and tightly packing such collar to the encircled pipe. It is obviously immaterial whether the member which I have here designated as a "pipe" be such, as a solid rod of other peripheral configuration may be employed, in which case it is merely necessary that the encircling collar closely conforms to such peripheral configuration. However, the construction here shown, especially when adapted to girders, will probably be that most frequently met with in the course of structural erection, and it has therefore been selected as the best means of illustrating the embodiment of my invention. Such collar will have wide radially-extending flanges 324, which will protrude over and bear upon the annular seat circumscribing the orifice. Such flanges will be made of varying width at suitable points, according to the direction in which it is anticipated that the principal displacement will occur. As shown in the drawings, I have illustrated the flange as having a greater vertical than horizontal width, because it may be expected that the usual settling and distortion of foundations will be greatest in this direction. To accommodate this greater displacement, the circumscribing pocket or recess will be of corresponding size to allow of such movement.

That the aforesaid parts may be retained in close sliding contact and that the union therebetween may be further improved I apply a cap-plate 34, which is formed with orifice and bearing seats corresponding to such face-plate. Such cap will preferably be made in a number of sections suitably bolted together by means of flanges 35; but this is a feature which may be altered as conditions may require. In some instances—such as, for example, where the pipes, columns, I-beams, or like members pass up through the floor instead of through the wall—it is not so necessary to provide for a lateral displacement of such members. In these instances the principal movement and shifting will be in a direction along the axis of such protruding member, and it is merely necessary to provide for a very slight displacement in this direction. In the case of pipes where it is not anticipated that any appreciable lateral displacement may take place it is best to employ a structure in which a bushing or packing ring is provided with lugs and bolts drawing into contact therewith a coacting ring, together with packing material. The bushing is preferably covered over a lining of hydrolithic mortar or other suitable material.

The various modifications in the specific details of this construction which may be resorted to within the scope of this invention will be understood upon referring to the following claims.

I claim—

1. In a waterproof-wall construction, an impervious wall, eyebolts pivotally affixed thereto and at their other end pivotally and slidably affixed to a supporting-wall.

2. In a building construction, a background, eyebolts affixed therein, bars passing through the eyes of such bolts, links encircling such bar at one end and encircling transversely-extending bars at their other end, said bars being embedded within and maintaining in place a wall of impervious material.

3. In a building construction, a chamber, and an integral impervious casing of plastic material set therein, said casing being rigidly anchored to the floor of said chamber and flexibly affixed to the wall thereof by a link means, said link means comprising bracing-bars embedded within the wall of said casing, and eyebolts affixed at one end to said bars, and at the other slidably encircling bars maintained parallel to a chamber-wall.

4. In a building construction, a chamber, and an integral impervious casing set therein and bonded to the side walls thereof, said casing resting directly upon the floor of said chamber and rigidly anchored thereto by means of a series of vertically-extending anchor-bolts.

5. In a building construction, an impervious septum, forming a casing having bonded walls and a bottom having a series of bars

embedded therein, and a plurality of anchor-bolts affixed at one end to said bars and at the other to the adjacent chamber-face, said bars being provided at such end with relatively wide screw-flanges.

6. In a building construction, a casing having bonded side walls and an impervious floor, bars embedded therein, and a plurality of anchor-bolts affixed to said bars at their upper end and retained in the underlying soil by means of wide spiral flanges extending from their lower end.

7. In a building construction, an impervious casing having bonded side walls and a floor of impervious plastic material affixed to the underlying soil by means of a plurality of anchor-bolts having wide screw-threads for engagement with the soil.

8. In a building construction, an impervious casing having bonded side walls and a relatively thin floor of impervious material, a series of bars bracing said floor and embedded therein, and a plurality of anchor-bolts affixed to said bars at points of crossing thereof and extending into the underlying soil and retained against withdrawal therein by means of wide screw-threaded flange ends.

9. In a building construction, an impervious casing having bonded side walls and a plurality of vertically-extending eyebolts screw-threaded at their lower end and thereby affixed in soil, bracing-bars passing through eyes at the upper end of said bolts, a mesh of wire lying above said bars, and an impervious septum of plastic material surrounding and embedding said mesh and underlying bars.

In testimony whereof I affix my signature in presence of two witnesses

EDWARD JARVIS WINSLOW.

Witnesses:
ALBERT F. NATHAN,
EDITH C. SCERLES.