



US 20230070442A1

(19) **United States**

(12) **Patent Application Publication**
THOOPPHONTHAP

(10) **Pub. No.: US 2023/0070442 A1**

(43) **Pub. Date: Mar. 9, 2023**

(54) **INSTALLATION PROCESS FOR PRECAST REINFORCED CONCRETE HEAVY DUTY RETAINING WALL**

Publication Classification

(71) Applicant: **Phiproei THOOPPHONTHAP**,
Amphur Pakkred, Nonthaburi (TH)

(51) **Int. Cl.**
E02D 29/02 (2006.01)
E04G 1/38 (2006.01)

(72) Inventor: **Phiproei THOOPPHONTHAP**,
Amphur Pakkred, Nonthaburi (TH)

(52) **U.S. Cl.**
CPC *E02D 29/0266* (2013.01); *E02D 29/0233*
(2013.01); *E04G 1/38* (2013.01); *E02D*
2600/30 (2013.01); *E02D 2300/002* (2013.01)

(21) Appl. No.: **17/798,609**

(57) **ABSTRACT**

(22) PCT Filed: **Mar. 8, 2021**

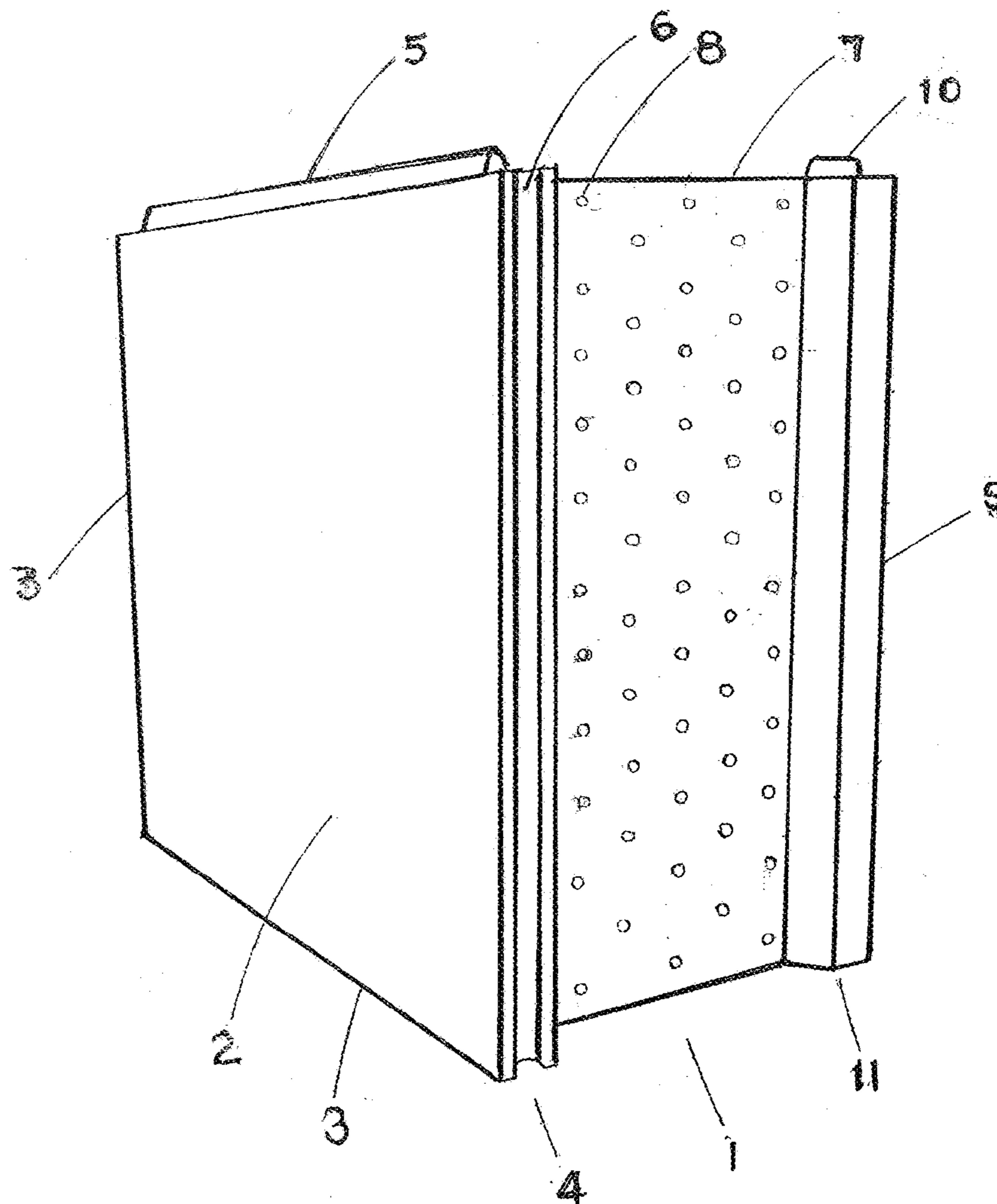
A retaining wall installation process for earth and water retaining wall, first step starting from preparing precast reinforced concrete heavy duty retaining wall (1) on the ground, inserted horizontal rebars (12) at each fin (7) passed to the holes (8), connected mechanical couplers (14) only one end of horizontal rebars. Attached shuttle-platform (16) to precast reinforced concrete heavy duty retaining wall (1). Then lift up to installed the wall at construction site, put down the vertical rebars (15) connected to the lower vertical rebars by using mechanical couplers (14), tie vertical rebars to horizontal rebars, then closed the vertical cavities (24) by using panel closer (28) and poured fresh concrete (29). After final setting time, removed shuttle-platform down to the ground.

(86) PCT No.: **PCT/TH21/00007**

§ 371 (c)(1),
(2) Date: **Aug. 10, 2022**

(30) **Foreign Application Priority Data**

Mar. 9, 2020 (TH) 2003000506



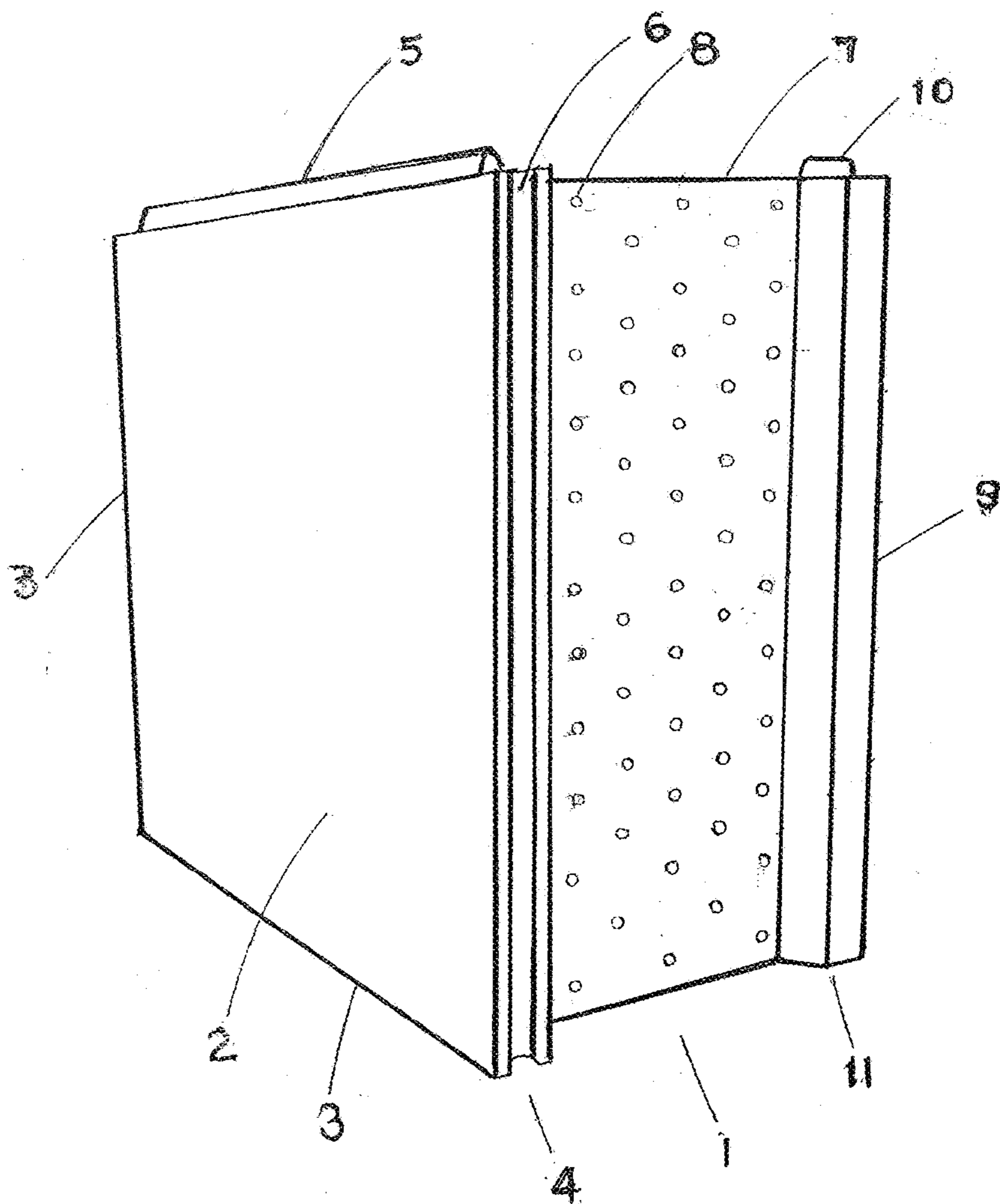


Fig. 1

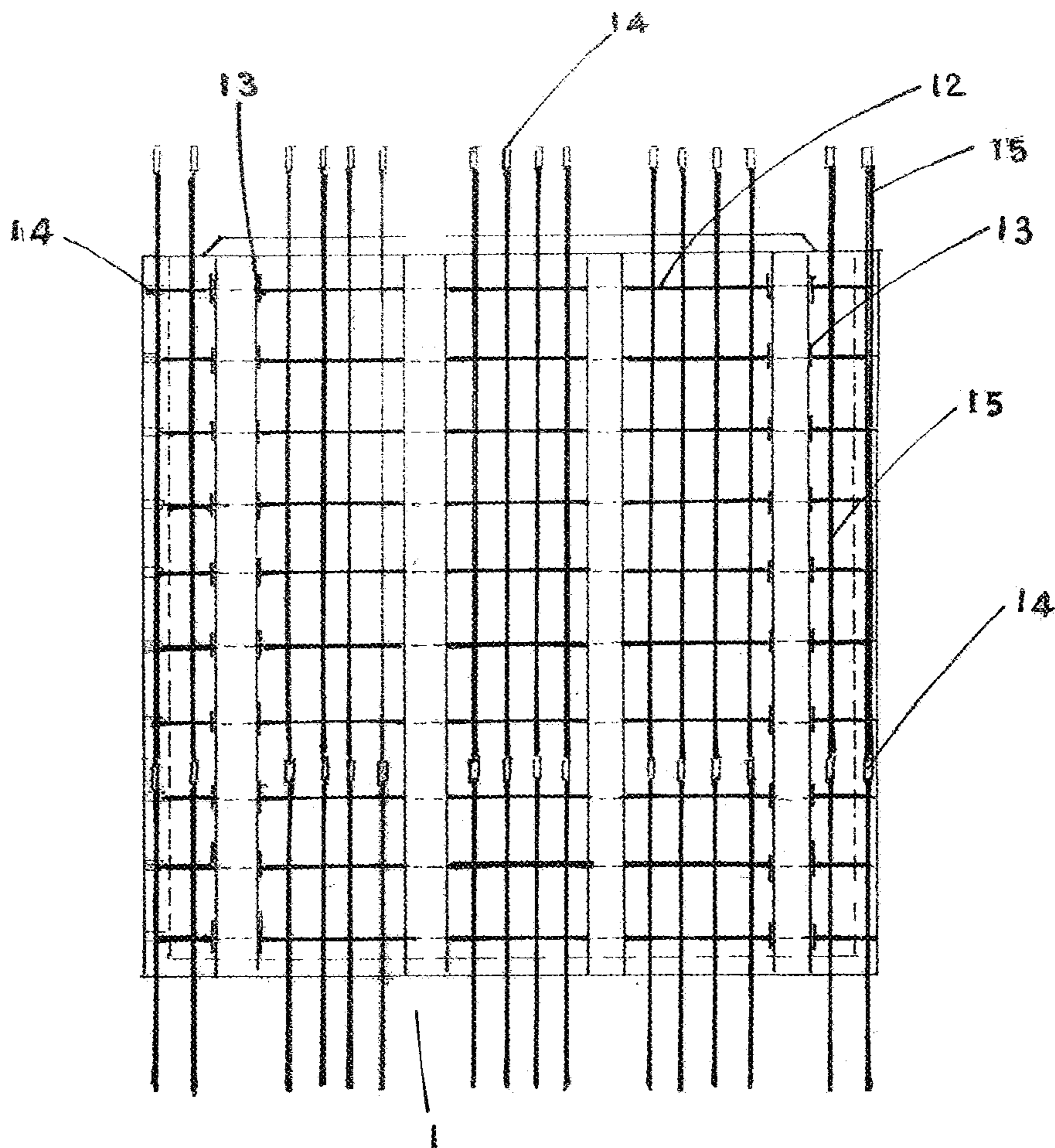


Fig. 2

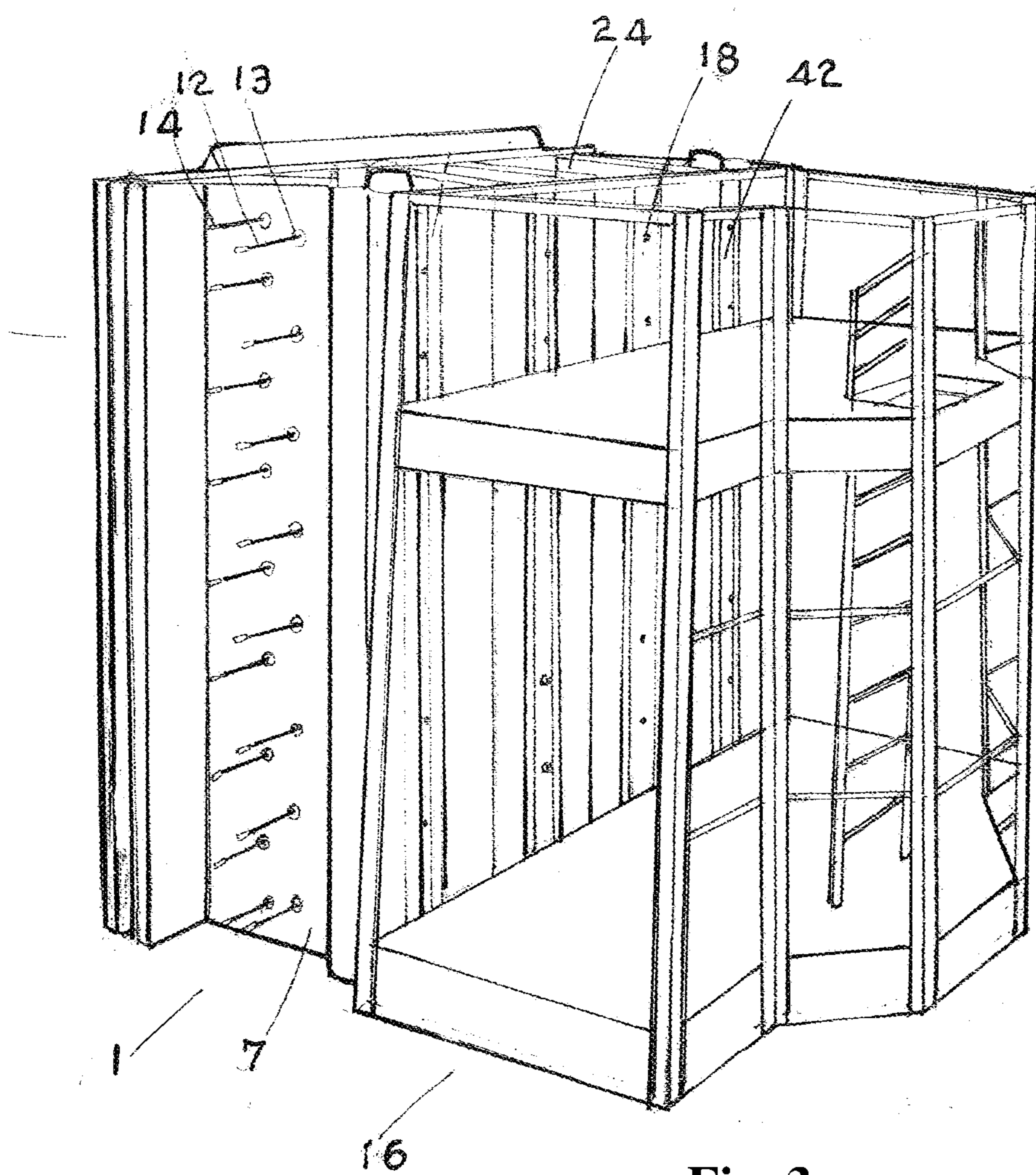


Fig. 3

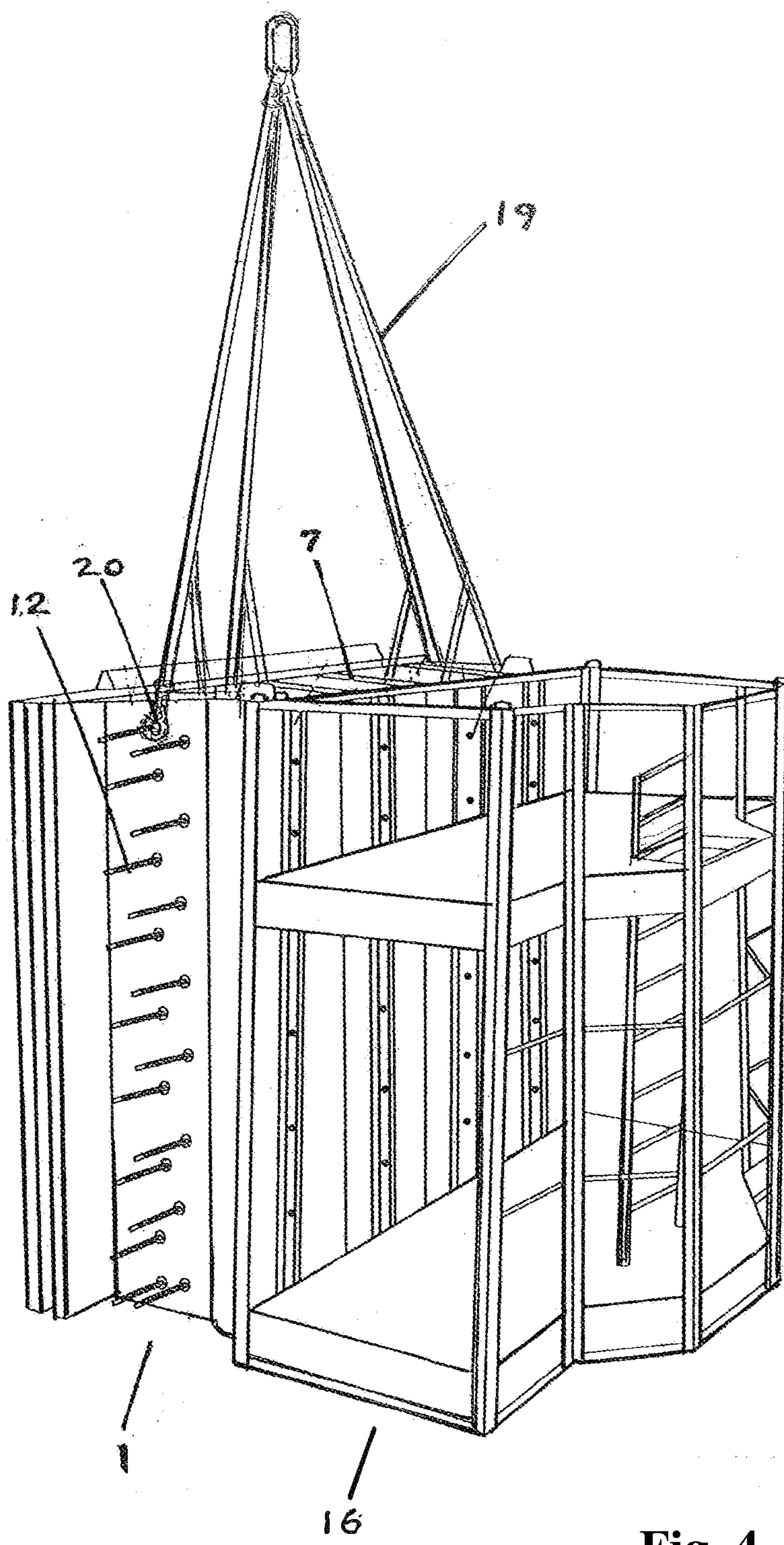


Fig. 4

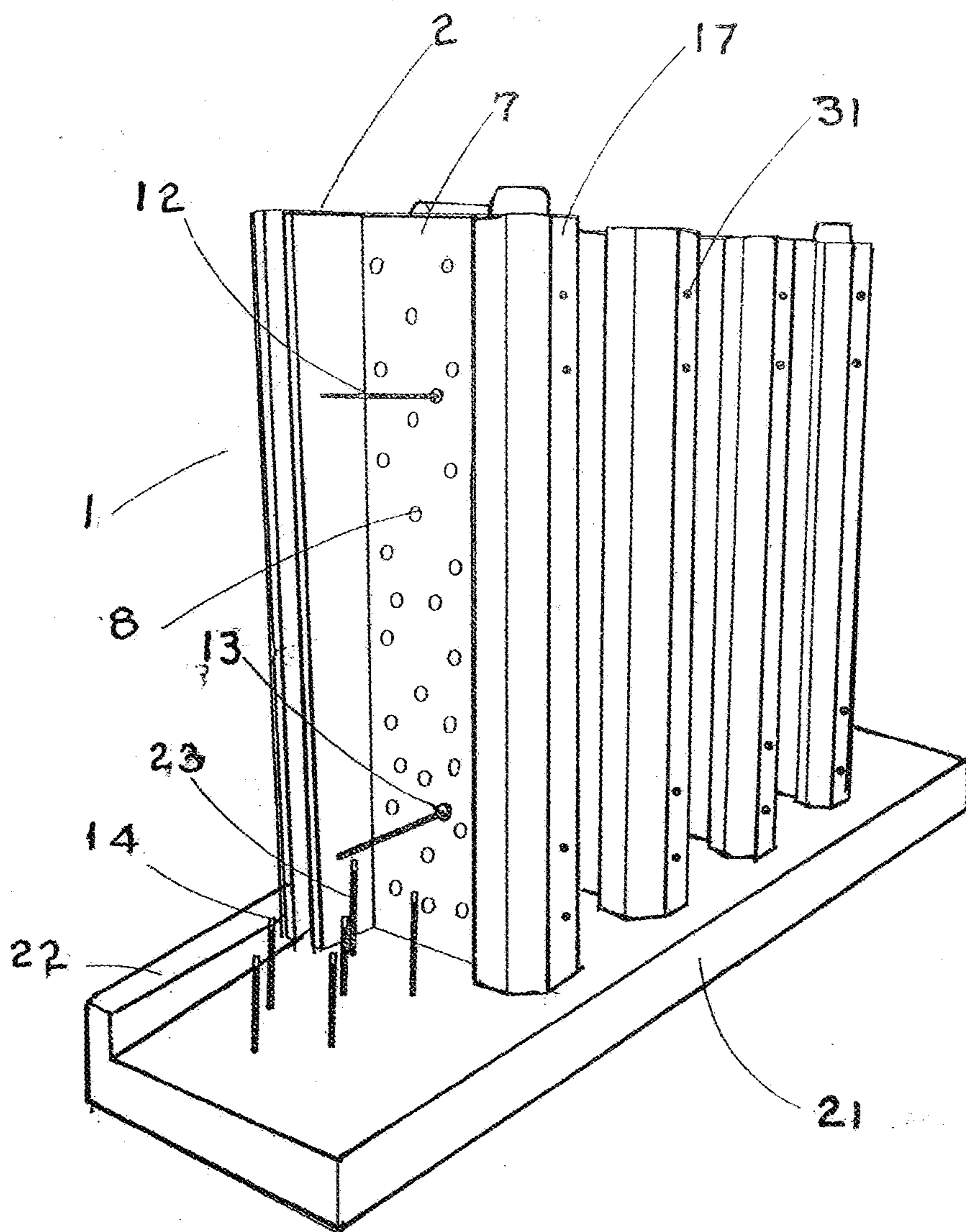


Fig. 5

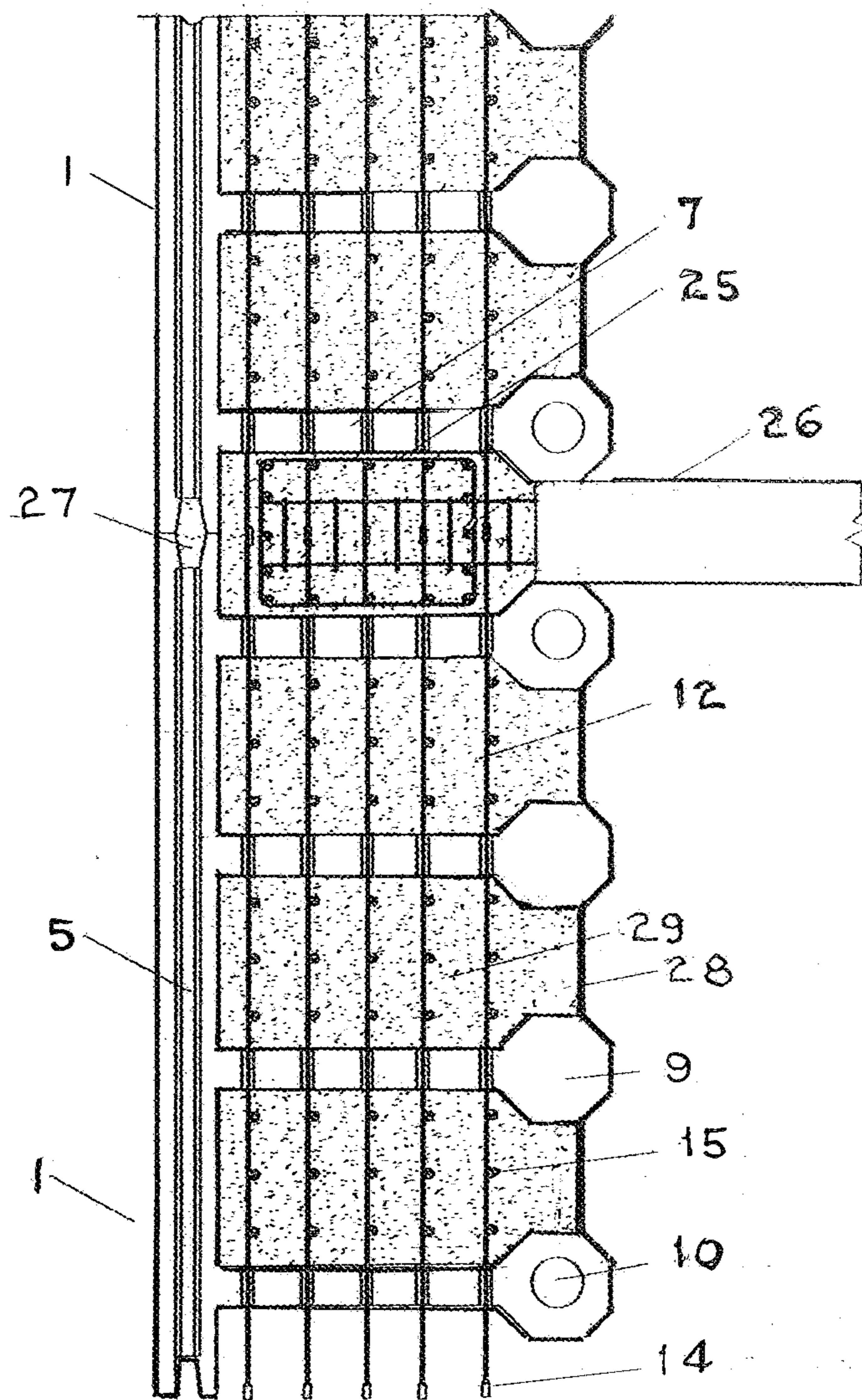


Fig. 6

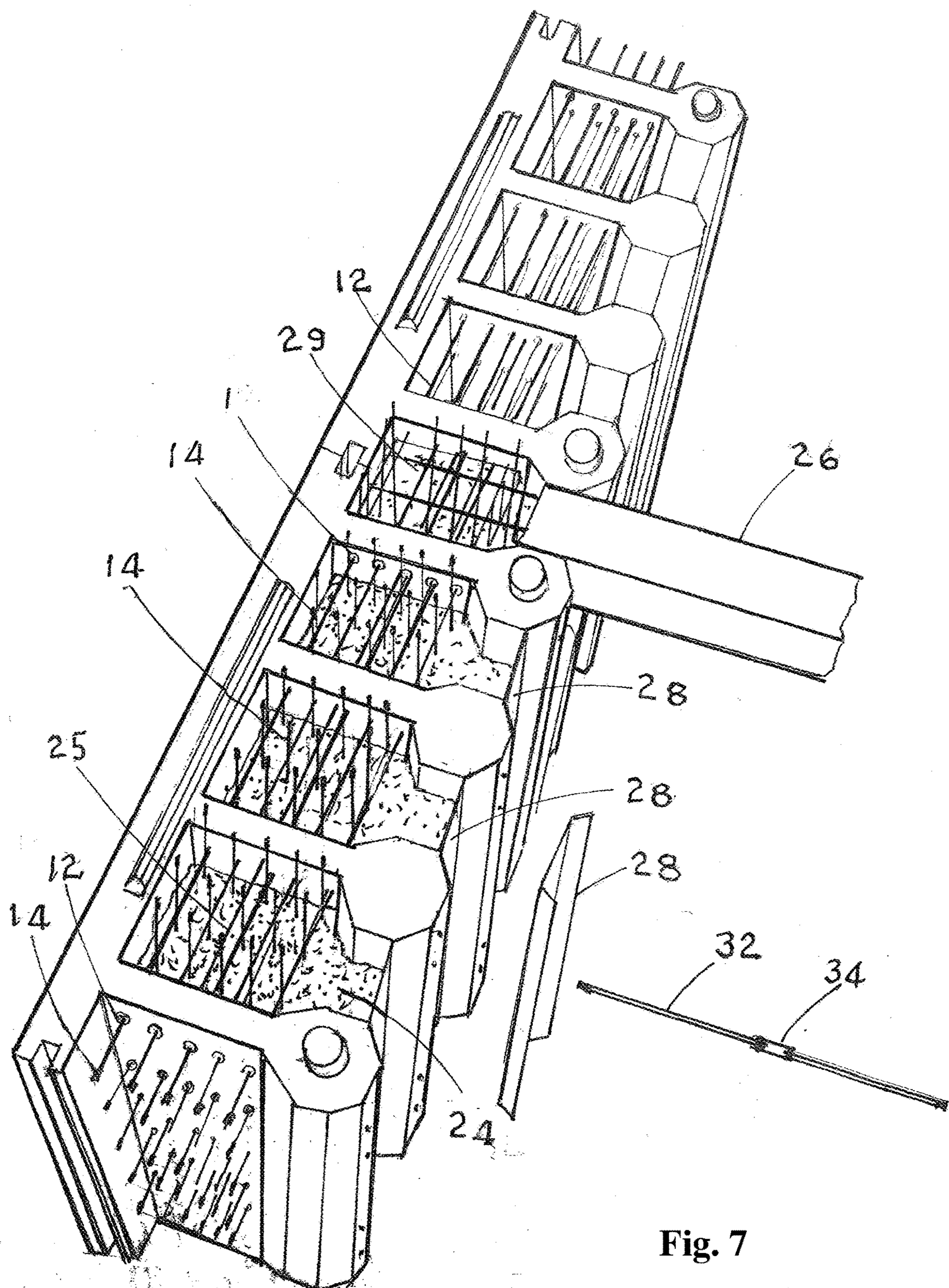


Fig. 7

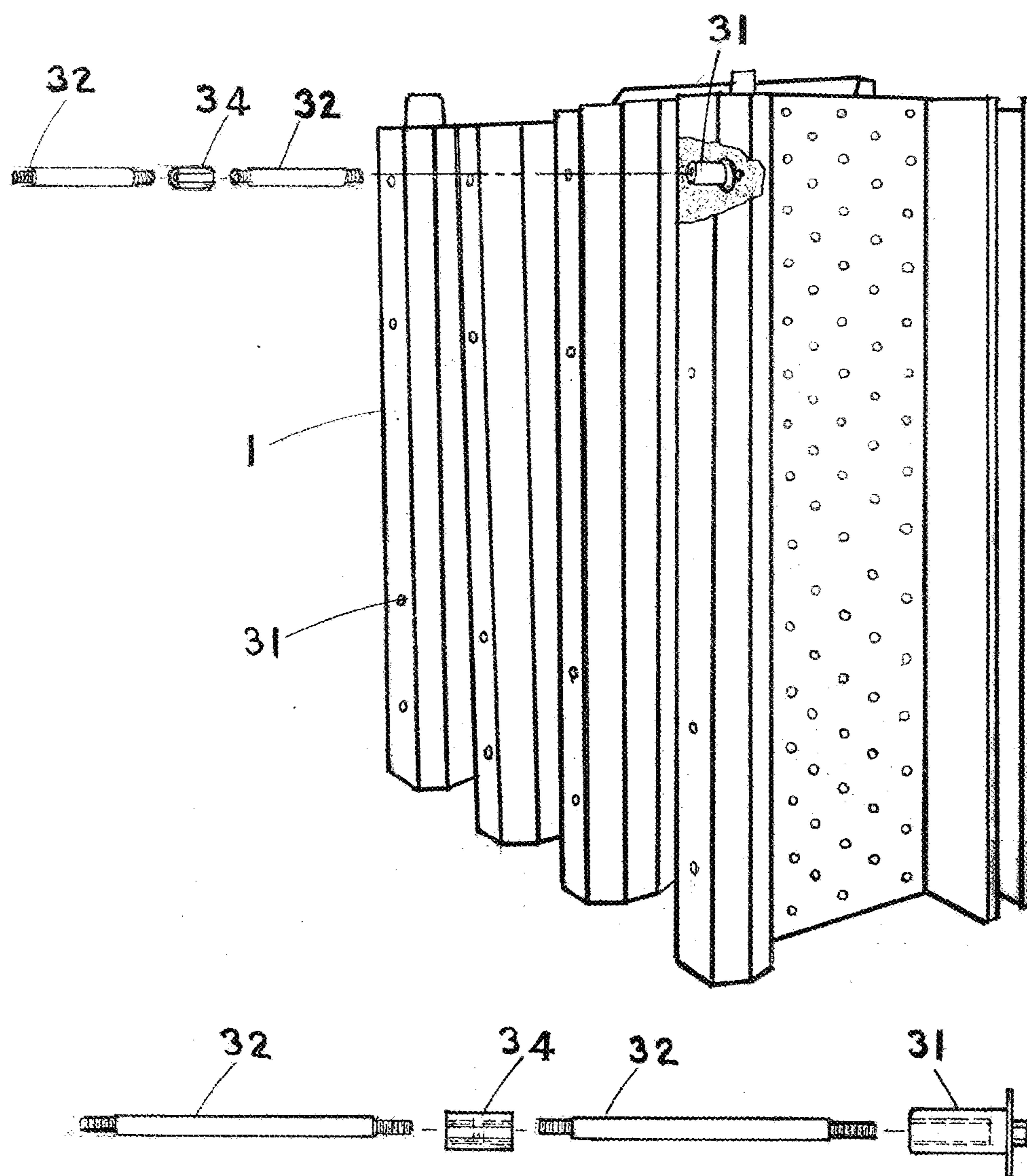


Fig. 8

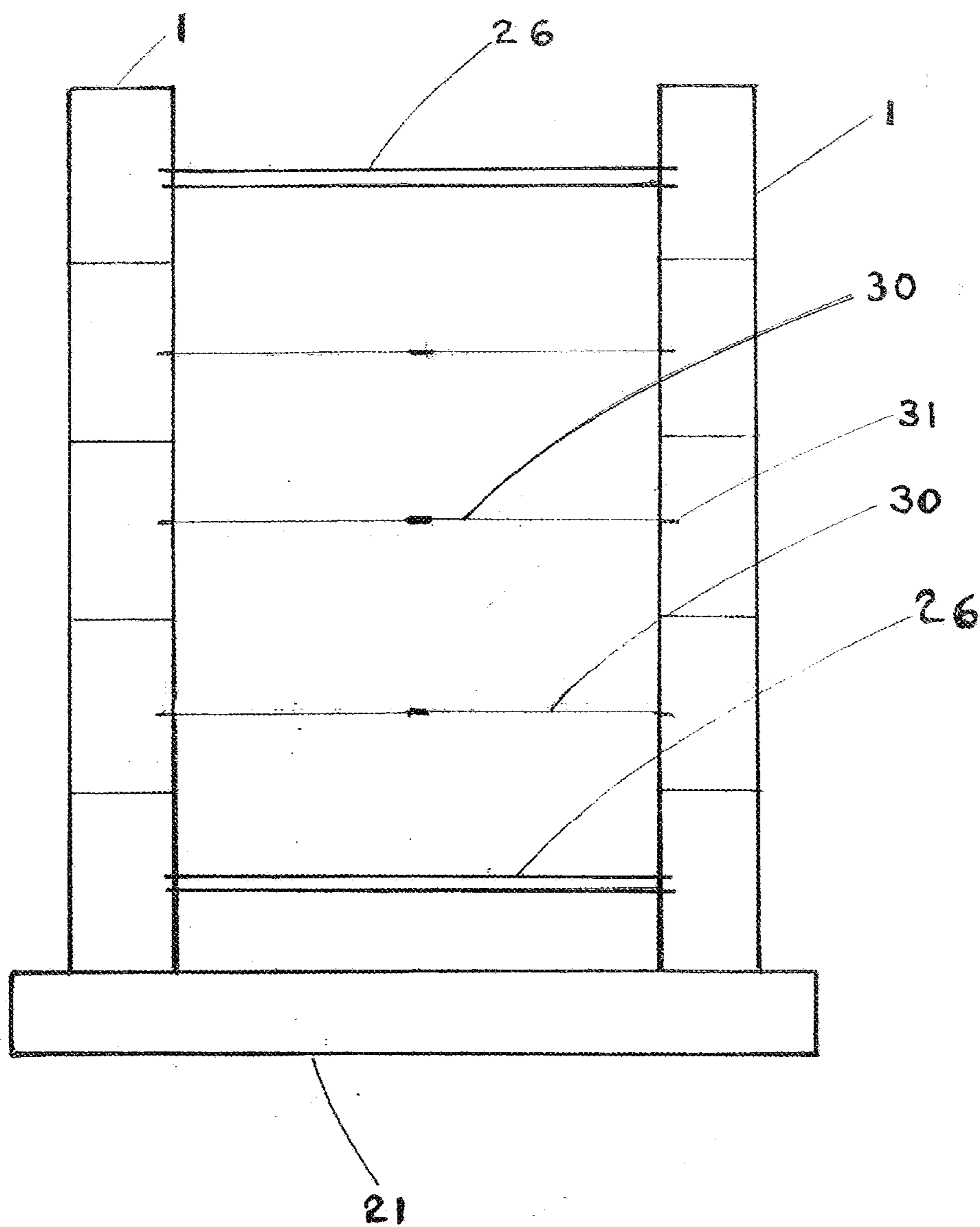


Fig. 9

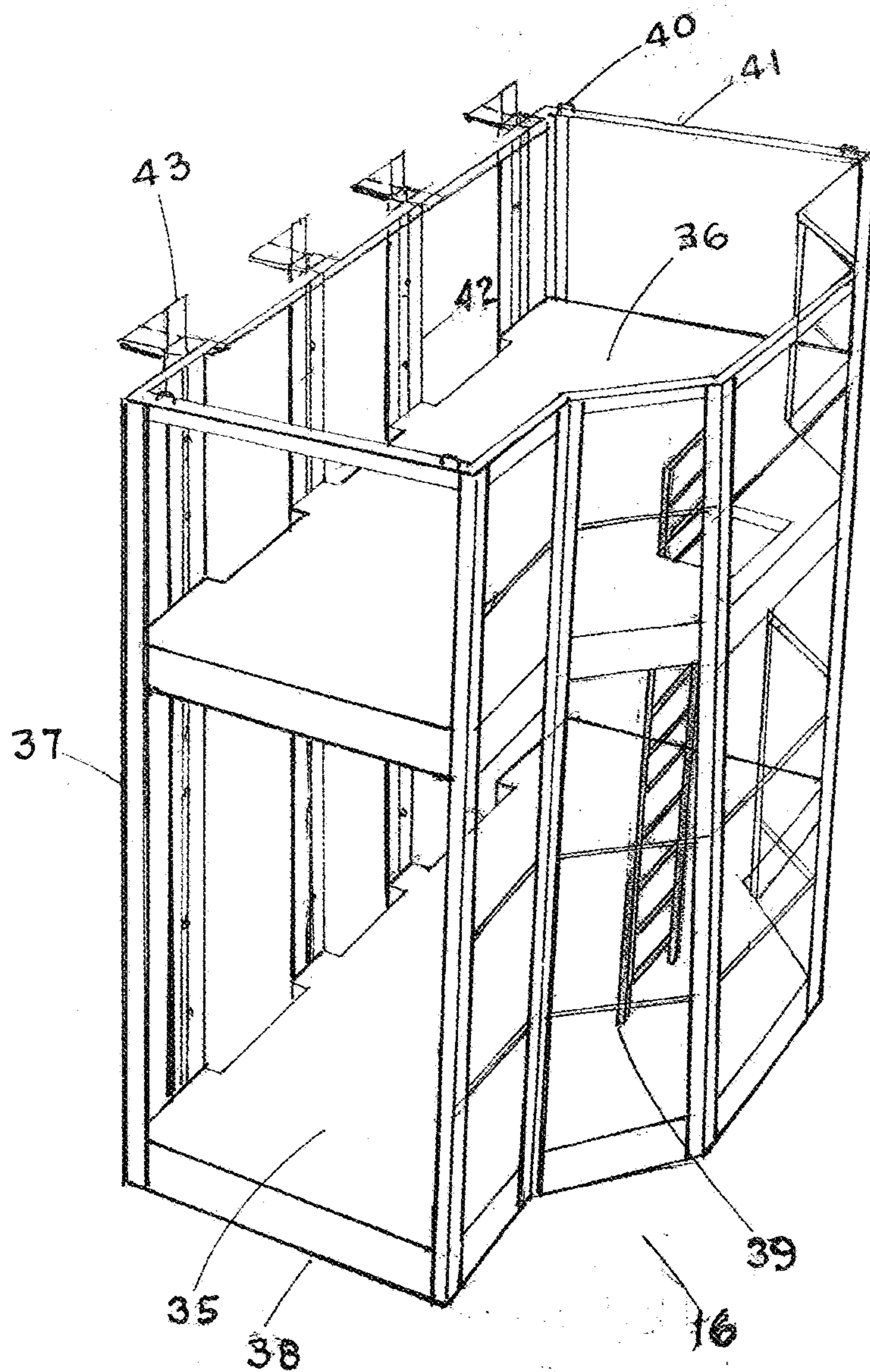


Fig. 10

INSTALLATION PROCESS FOR PRECAST REINFORCED CONCRETE HEAVY DUTY RETAINING WALL

TECHNICAL FIELD

[0001] The present invention pertains generally to retaining walls. Specifically, the invention related to installation process for a completely precast reinforced concrete heavy duty retaining wall of the type typically used along the earth and water retaining wall.

BACKGROUND ART

[0002] Precast reinforced concrete heavy duty retaining wall WO/2018/160143 this innovations modified from Precast reinforced concrete walls H shape WO/2015199622. The purpose of these invented needs to develop the traditional construction and the construction the walls now a day are cast—in—place or cast in situ.

[0003] Changed to the new constructing methods from cast in place or cast in situ to precast walls, which is to inserted steel reinforcement, does not used form works and scaffolding entirely. The real disadvantage of cast—in—place or cast in situ is the high amount of labor, it is using vastly of cast—in—place or cast in situ is the high amount of labor, it is using vastly of construction materials such as form work and scaffolding, erection of form work is a time consuming, concrete must cure before it is not loaded, quality controls of finish is not assured, and the climate create problem for curing and construction itself, the labor is problem.

[0004] The advantages of precast concrete retaining walls, who having many benefits, such as using precast concrete walls should be saved budget by reducing the time spent on the project and by being less expensive than many construction materials. Precast concrete should be cast in factory, using the same molds over and over, it is easy to maintain uniformity, and quality checked before going the job site. The installation should lift by crane. Saving time no time is wasted forming, framing, pouring or curing, which is the project can begin right away.

BRIEF DESCRIPTION OF DRAWINGS

[0005] FIG. 1 is a perspective view of Precast reinforced concrete heavy duty retaining wall.

[0006] FIG. 2 is a cross sectional view of Precast reinforced concrete heavy duty retaining wall, shown the steel rebars reinforcement.

[0007] FIG. 3 is a perspective view of shuttle-platform attach to the Precast Reinforced concrete heavy duty retaining wall.

[0008] FIG. 4 is a perspective view of Precast reinforced concrete heavy duty retaining wall and shuttle-platform lift up by multi-leg webbings.

[0009] FIG. 5 is a perspective view of Precast reinforced concrete heavy duty retaining wall seated on Foundation.

[0010] FIG. 6 is a top view of a pair of Precast reinforced concrete heavy duty retaining wall laid in row.

[0011] FIG. 7 is a perspective view of Precast reinforced concrete heavy duty retaining wall installation, shown steel bar reinforcement following FIG. 6

[0012] FIG. 8 is a perspective view of Precast reinforced concrete heavy duty retaining wall, shown tie rod used between double walls.

[0013] FIG. 9 is a front view of Precast reinforced concrete heavy duty retaining wall shown tie rod and tie-precast reinforced concrete beam installed between double walls.

[0014] FIG. 10 is a perspective view of shuttle-platform shown details structures.

DISCLOSURE OF THE INVENTION

[0015] As shown in FIG. 1 is a Precast reinforced concrete heavy duty retaining wall (1), having a face panel (2), precast reinforced wall comprising a substantially length and height (3) are square wall panel, in which having wall thickness (4), the upper surface having notch (5), and the center line of wall thickness (4) for male Interlocking, the left surface, the right surface and lower surface at three places having grooves (6) located at the center line of wall thickness (4) all sections, sizes, and configurations of grooves (6) are substantially equally, and the lower groove (6) of the upper precast reinforced concrete heavy duty retaining wall (1) could be seated firmly on the lower notch (5).

[0016] There are four fin (7) at the right hand side homogeneous with the rear of wall thickness (4) each fin having holes (8) And the right hand side of each fin (7) having regular octagon column (9) homogeneous with fins (7), the center of upper surface of outer left and outer right of regular octagon columns (9) having protrude male Interlocking (10), and the center of lower surface in opposite direction having female Interlocking (11) could be worn with protrude male Interlocking (10) firmly.

[0017] As shown in FIG. 2 is a sectional view shown the rear view of Precast reinforced concrete heavy duty retaining wall (1). First step, preparing the rear face of Precast reinforced concrete heavy duty retaining wall (1) on the ground, by prepared the horizontal rebar, length of them are equal to the length and height (3) of Precast reinforced concrete heavy duty retaining wall (1), inserted horizontal rebars passed to the holes (8) of each fin from left to right or from right to left, the horizontal rebars (12) should be laid not less than three layers, then inserted a pair of washer (13) passed to the horizontal rebars, attached in opposite sides of each fin (7) and on outer left and outer right, welded between washer to horizontal rebars. (12).Connected mechanical couplers (14) only one end of each horizontal rebar. On work site, put the vertical rebars (15) from upper connected to the lower vertical rebars (15) by using mechanical couplers (14), in which all mechanical couplers (14) are on the upper end of each vertical rebar. Then tie vertical rebars to horizontal rebars (12) by using tying machine.

[0018] As shown in FIG. 3 is a perspective view shown shuttle-platform (16) attached to Precast reinforced concrete heavy duty retaining wall (1) at the rear face panel (17) of each regular octagon column (9) fasten bolts not less than four points at each rear face panel (17) of the regular octagon columns (9).

[0019] As shown in FIG. 4 is a perspective view of Precast reinforced concrete heavy duty retaining wall (1) attached with shuttle-platform (16) by fastened bolts. Prepare to lift up by using multi-leg webbings (19) and having eye slip hook (20) clamps to a pair of the upper most horizontal rebars (1) in opposites direction between each fin, then lift up to installed on the wall at work site.

[0020] As shown in FIG. 5 is a perspective view of Precast concrete heavy duty retaining wall (1) the first step seated on the foundation (21) without shuttle-platform (16). The foun-

dation having straight curb (22) for attached the face panel (2) of Precast reinforced concrete heavy duty retaining wall (1). The foundation having protrude vertical rebars (23) then connected vertical rebars (15) to protrude vertical rebars (23) by using mechanical couplers (14) and tied vertical rebars (15) to horizontal rebars (12) by tying machine.

[0021] As shown in FIG. 6 and FIG. 7 are the top plan view and perspective view of Precast reinforced concrete heavy duty retaining wall (1). After installed first Precast reinforced concrete heavy duty retaining wall (1), as shown in FIG. 5 completely. Then lift the second Precast reinforced concrete heavy duty retaining wall (1) down to seated on the foundation in row, adjacent to the first retaining wall, connected to each horizontal rebar between first Precast reinforced concrete heavy duty retaining wall (1) to second Precast reinforced concrete heavy duty retaining wall (1) by using mechanical couplers (14). The vertical cavity (24) between a pair of Precast reinforced concrete heavy duty retaining wall (1) should be installed steel reinforcement column (25) at each column, and should be connected tie-precast reinforced concrete beam (26) for double walls. Fill in grout into the narrow hole (27), put the vertical rebars down to connected with lower vertical rebars by using mechanical couplers (14), then closed the vertical cavity (24) by panel closer (28) then poured fresh concrete (29) to each vertical cavity (24) during setting time not less than 10 hours. Later time removes panel closer (28) out, took out shuttle -platform from each Precast reinforced concrete heavy duty retaining wall (1) lift down to the ground, and prepared to the next step of installation.

[0022] As shown in FIG. 8 is a perspective view of precast reinforced concrete heavy duty retaining wall (1) shown tie rod assembly (30) are used for stretching between double Precast reinforced concrete heavy duty retaining walls (1) which is this tie rod assembly (30) having internal RH threaded rod (31) embedded in the rear face panel (17) of double walls in opposite sides and same level of regular octagon column (9) in each rear face panel (17) having internal RH threaded rod (31) not less than four places. And at right hand side having deform bar (32) in which right end is external RH threaded connected with internal RH thread rod (30) and the left end is external LH threaded. Likewise the left hand side having deform bar (32) the left end is external RH thread connected with internal RH thread rod (30) and the right end is external LH thread rod (33) connected with turn buckle (34) the length of turn buckle not less than five times of the diameter of deform bar (32). And the left end of deform bar (32) connected with turn buckle (34).

[0023] As shown in FIG. 9 is the front view of double walls of precast reinforced concrete heavy duty retaining walls (1) installed on the left hand side and precast reinforced concrete heavy duty retaining wall (1) installed on the right hand side, all of these are seated on the foundation and should be connected with tie-precast reinforced concrete beam (26) stretching between the left and right of Precast reinforced concrete heavy duty retaining wall (1) the right hand side, each tie-precast reinforced concrete beam (26) should be connected with each steel reinforcement column. And having tie rods assembly (31) connected with internal RH thread rod (31) between double precast reinforced concrete heavy duty retaining walls (1).

[0024] As shown in FIG. 10 is a perspective view of shuttle platform (16) has shown in FIG. 3. The structure of

Shuttle-platform consisted of plurality of steel structure, and having two floors, first floor (35) and second floor (36), each floor are none metallic material, the high of first floor (36) to second floor (36) not less than two thirds of length and height (3). The height (37) of shuttle-platform (16) is equal to the length and height (3). The width (38) of shuttle-platform (16) not less than two thirds of length and high (3). Having stair (39) for climbed of work man the position is at the center of length of shuttle-platform (16). The lifting point (40) having four points on the hand rail (41) of second floor (36), and the upper of steel channels (42) connected with attaching assy (43) press on the upper surface of regular octagon columns.

1. The installation process for precast reinforced concrete heavy duty retaining wall comprising:

precast reinforced concrete heavy duty retaining wall, comprising a substantial length and height are square wall panel, having notch for male Interlocking, the right surface, the left surface, and the lower surface, having grooves, a groove of lower surface should be seated on the notch male Interlocking firmly. the right hand side having four fin, homogeneous with wall panel, each fin having several hole, using for inserted horizontal rebars, the right hand side of each fin having regular octagon column, which homogeneous with fins, the center of upper surface of outer left and outer right of regular octagon columns, having protrude male Interlocking, and the center of lower surface having female Interlocking, should be worn to protrude male Interlocking firmly.

2. The precast reinforced concrete heavy duty retaining wall of claim 1, wherein said the installation process, the first step began on the ground by preparing the horizontal rebars, length of them are equal to the length of precast reinforced concrete heavy duty retaining wall, inserted horizontal rebars passing to the holes of each fin, should be laid not less than three layers, and inserted a pair of washer passed to the horizontal rebars, attached in opposite sides of each fin, welded between washer to horizontal rebars, connected mechanical couplers only one end of each horizontal rebar.

3. The precast retaining wall in claim 1, wherein said having shuttle-platform attached to precast reinforced concrete heavy duty retaining wall at the rear face panels of each regular octagon column, fasten bolts not less than four points at each rear face panel, and connected attaching Assy, to four steel channels.

4. The precast retaining wall in claim 3, wherein said preparing to lift up precast reinforced concrete heavy duty retaining wall by using multi-leg webbings, and at the end of webbings having eye slip hook, clamps to a pair of upper most of horizontal rebars in opposite side between fin, then lift up to installed the wall at the construction site.

5. The precast retaining wall of claim 3, wherein said lift down precast retaining wall to seated on the foundation without shuttle-platform, the foundation having straight curb. Put down the vertical rebars from the upper matching with lower protrude rebars, connected by using mechanical couplers, and tie vertical rebars to horizontal rebars by using tying machine.

6. The precast retaining wall of claim 5, wherein said second precast reinforced concrete heavy duty retaining wall, lifted down to seated adjacent to the first precast retaining wall, connected each horizontal rebars by using

mechanical couplers, fill in grout to the narrow hole, put the vertical rebars down to connected to the lower vertical rebars by using mechanical couplers, closed the vertical cavity by using panel closer, and poured fresh concrete to each vertical cavity of precast retaining wall, after final setting time, removed each panel closer, took out shuttle-platform, and lift down to the ground.

7. The precast retaining wall of claim 6, wherein said the vertical cavity arising from connections between double precast reinforced concrete heavy duty retaining wall in row, should be installed steel reinforcements column, and the position of steel reinforcement column, should be connected tie-precast reinforced concrete beam, connected between double walls in opposite sides.

8. The precast retaining wall of claim 7, wherein said the installation of tie rod assembly should be stretching between double walls of precast retaining wall, tie rod assembly comprising (Number 1) internal RH thread rod, having two pieces embedded in a pair of rear face panel in opposite sides, left side of (Number 1) internal RH thread rod, having (Number 2) deform bar, the right end and left end of deform bar are RH threaded, connected to (Number 1) internal RH

thread rod, and the left end connected to the (Number 3) turn buckle, the left hand of turn buckle is (Number 4) deform bar, which is the right end is LH thread connected to turn buckle and the left end is RH threaded connected to the last (Number 1) internal RH thread rod.

9. The precast retaining wall of claim 3, wherein said shuttle-platform consist of plurality of steel structure, the length of Shuttle-platform not more than the length of precast reinforced concrete heavy duty retaining wall, the high from first floor to second floor not less than two thirds of length, the floors are none metallic material, the high of Shuttle-platform not included the attaching assembly, is equal to the high of precast reinforced concrete heavy duty retaining wall, the width of Shuttle-platform is not less than two thirds of height, having stair located at the center of length, lifting point having four points on the hand rail of second floor, upper of steel channels of Shuttle-platform, connected with attaching assembly using for pressed the area on the upper surface of regular octagon columns at four places.

* * * * *