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(54) Long-life pavement system

(57) A system of pavement for the transfer of vehicular and static loads by means of different combinations of distributor plates (1) with or without stiffener framework (2, 3, 4), with all its reinforced concrete elements (7, 8, 9), with no longitudinal or cross joints, such as those used in rigid pavements, capable of distributing the contact pressures of the loads over a larger area of support soil (5) without the need of granular interface(s).

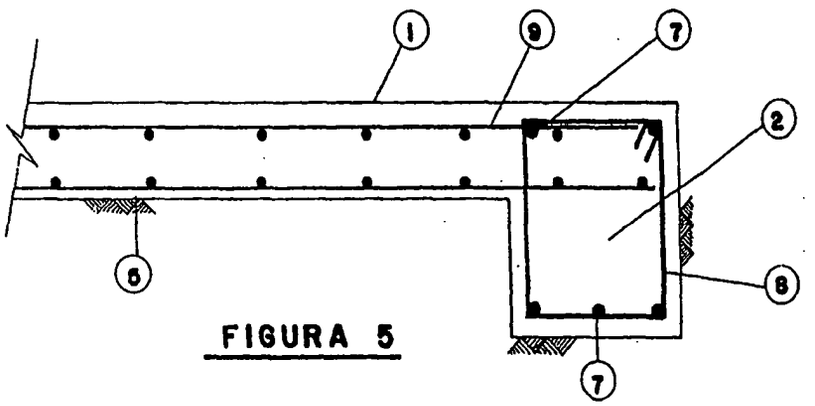

FIGURA 5

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Description

[0001] This invention refers to a long-life pavement system.

[0002] The invention and its application reduce the costs of road improvements and facilitate the processes. The application of long-life pavement eliminates shortcomings in the operation, durability, resistance and use of traditional pavements, eliminates, in rigid pavement, the wear and tears due to the joints, resolving the problems of vehicle vibration. Vibration induced by the joints prevents the use of rigid pavement in many road systems such as in airports and high-speed highways. Long-life pavement, by not having joints, and by using a reinforcement system, eliminates bumps, which cause rigid pavement to deteriorate. In this system there is only one joint every hundred or so meters, the cross joint which separates the concrete pour process and resolves the problems of transfer by means of the joint transfer key, always accomplished in deep double cross elements. The absence of joints facilitates the extension of the use to pavements in pedestrian walkways or industrial roadways.

[0003] The integral nature of the system resolves the problem of relative vertical displacements, the raising of edges by the passage loads, sinkage due to excessive pressure on the edge, differentiated settling caused by pumping on an edge or the breaking of a segment, or due to deficiency or a lack of homogeneity in the foundation soil. The defects of rigid pavements on slopes due to the displacement of concrete sections as the result of braking, friction and vibration disappear as well. Differences in resistance between reinforced concrete and other materials is immense in terms of cost, and it would be unnecessary to explain it, but it is required to say that the rupture module that defined the limit of force and durability of traditional pavement has completely lost its effectiveness.

[0004] This long-life pavement system has a much greater capacity to transfer loads and lesser pressures on the supporting soil than the world's traditional pavements, which allows it to use the present structure on most of the compacted roads in the world, including those of earth with a slight improvement of the subsoil.

[0005] Conceptual development for the invention of the long-life pavement system has a solid and dense conceptualization, the fruit of years of study, application and development of the knowledge of the inventor in the subject; he who is available to give detailed explanations in this regard.

[0006] Aspects of the present invention are illustrated by way of example, and not by way of limitation, in the accompanying drawings wherein:

Figure 1 includes a top and cross-sectional views of an embodiment of a pavement system.

Figure 2 includes top view and cross-sectional views of an alternative embodiment of a pavement system.

Figure 3 includes top view and cross-sectional views of another alternative embodiment of a pavement system.

Figure 4 includes a top view and cross-sectional views of yet another alternative embodiment of a pavement system.

Figure 5 is a cross-sectional view of a further embodiment of a pavement system.

Figure 6 is a cross-sectional view of yet a further embodiment of a pavement system.

Figure 7 is a cross-sectional view of another embodiment of a pavement system.

Figure 8 is a cross-sectional view of yet another embodiment of a pavement system.

Figure 9 is a cross-sectional view of a further embodiment of a pavement system.

Figure 10 is a cross-sectional view of yet a further embodiment of a pavement system.

Figure 11 is a cross-sectional view of another embodiment of a pavement system.

Figure 12 is a cross-sectional view of yet another embodiment of a pavement system.

Figure 13 includes top and cross-sectional views of a further embodiment of a pavement system.

Figure 14 includes top and cross-sectional views of yet a further embodiment of a pavement system.

Figure 15 is a cross-sectional view of another embodiment of a pavement system.

Figure 16 is a cross-sectional view of yet another embodiment of a pavement system.

[0007] The long-life pavement system according to this invention is constructed of reinforced concrete, continuous, without the longitudinal or cross joints used in rigid pavements. There is only one cross joint (14) defined by the stretch of concrete poured daily, spaced hundreds of meters apart. The long-life pavement system has a distributor plate that (1) accepts the loads from the vehicles and redistributes them to existing support soil (5) in the current condition of unpaved road, or in urban or rural roads with deteriorated pavement or in new roads with the addition of solid, compacted substrata. The distributor plate that (1) is poured over the support soil without the requirement of intermediary granular coatings, although the system allows them without the thickness and qualities usual in traditional pavements being necessary, and their task when used is to play the role of granular interface (18), optional in accordance with design conditions.

[0008] The distributor plate (1) is contemplated in various types, as a solid distributor plate (20) or a relieved distributor plate (21)-the latter consisting of concrete ribs poured on-site, with alleviators (6) that may be of any size, in accordance with the design, cast rigid in ceramic clay or concrete, or of the flexible type manufactured of rough wood, bamboo tubes, wood composites (chipboard), treated cardboard or any system of rigid or

flexible engaged alleviators. When the relieved distributor plate (21) is used, the upper finish consists of a reinforced concrete plate to strengthen the distributor plate (9), consisting of electrically welded steel mesh, preferably poured solid with the ribs and over the alleviators so as to form the diaphragm of the relieved distributor plate (16).

[0009] The solid distributor plate (20) and the relieved distributor plate (21) both end laterally in the border elements of the distributor plate (22) with longitudinal reinforcement (23) or cross reinforcement (24) .

[0010] The long-life pavement system contemplates various possibilities for establishing longitudinal or cross rigidity, utilizing monolithic elements similar to beams, that increase rigidity by increasing the thickness from the lower face downward, from the upper face upward, with or without curbs or separators (13). The stiffening elements may combine increases in thickness simultaneously upward and downward as in the case of the berm ditch (12). Stiffeners are of the type of the lateral longitudinal element (2), central longitudinal element (3) in the axis of the road (19), intermediate longitudinal elements (25) and cross elements (4). The location and size of the longitudinal and cross stiffening elements may be in different positions throughout the length and breadth of the road, depending on the stretch of road, the surface finish and the design selected. Specifications for materials the longitudinal reinforcement (7) and the cross reinforcement (8) vary in accordance with the designs of the system.

[0011] The lateral finishes of the long-life pavement system have all the diversity of the usual surface paving materials in the world, but monolithically integrated to the system and poured onsite in reinforced concrete. They may end in an overlap (17) with or without stiffener, with longitudinal lateral-axis beam (2) downwards in the edge, or with jutting overlap with the border integrated or not as a stiffener in the edge of the overlap, and with or without addition of thickness downwards.

[0012] The long-life pavement system requires a subsurface drainage system by means of a longitudinal filter (26) with geometry, materials and location depending on the design of the road.

[0013] All the elements of the structure of the pavement form an integrated monolithic whole, with a powerful capacity for distributing loads and pressures, even in weak soils. In the distributor plate the stiffeners, longitudinal and cross elements, berms (10), ditches (11), berm ditches (12) form geometric sections of great mechanical capacity, which, with appropriate specification of materials and longitudinal reinforcements (7) and cross reinforcements (8) added to mesh reinforcements, generate very large resistance to mechanical forces that make their work efficient.

[0014] The reinforced concrete structure proposed is very versatile. Using reinforced concrete is within the reach of all the communities in the country and around the globe. The fact that it does not require a sub-base or base eliminates dependence on heavy machinery. The configuration of the reinforcements, the production of concrete, supplies, equipment and tools, transportation and the pouring of concrete are broadly known and these processes, to a large extent, may be administered and carried out by the communities themselves with great savings and improvement in the income of the citizens. This facilitates road construction in isolated and poor communities, but if the paving of an urban street is required, or a project with high specifications that merit the use of installment technologies, nothing is better known in the world, with leading-edge technology ready to serve, than reinforced concrete.

Claims

1. A pavement system constituted of a reinforced concrete diaphragm that may or may not include stiffening elements, either engaged or overhanging from its faces, placed over natural terrain or over layers of non-native materials without separation joints and the usual spacing intervals.

2. A pavement system such as described in claim No. 1, **characterized by** not requiring granular bases and sub-bases as support material.

3. A pavement system such as described in claim No. 1, **characterized by** not requiring the expansion joints, contraction joints or structural joints presently used. Instead, the system is characterized as monolithic over considerable lengths of some hundreds of meters.

4. A pavement system such as described in claim No. 1, **characterized by** including elements of reinforced concrete in directions parallel and perpendicular or diagonal to the axis of the structure, located level with, above or under the traffic surface.

5. A pavement system such as described in claim No. 1, made up of poured concrete diaphragm structures, solid or relieved, reinforced with steel rods arranged in longitudinal, cross or diagonal directions with respect to the axis of the structure.

6. A pavement system such as described in claim No. 1, **characterized by** taking advantage of the structural integration of functional and esthetic elements of roads, such as curbs, ditches, berms ditches, canals and spillways into roads.

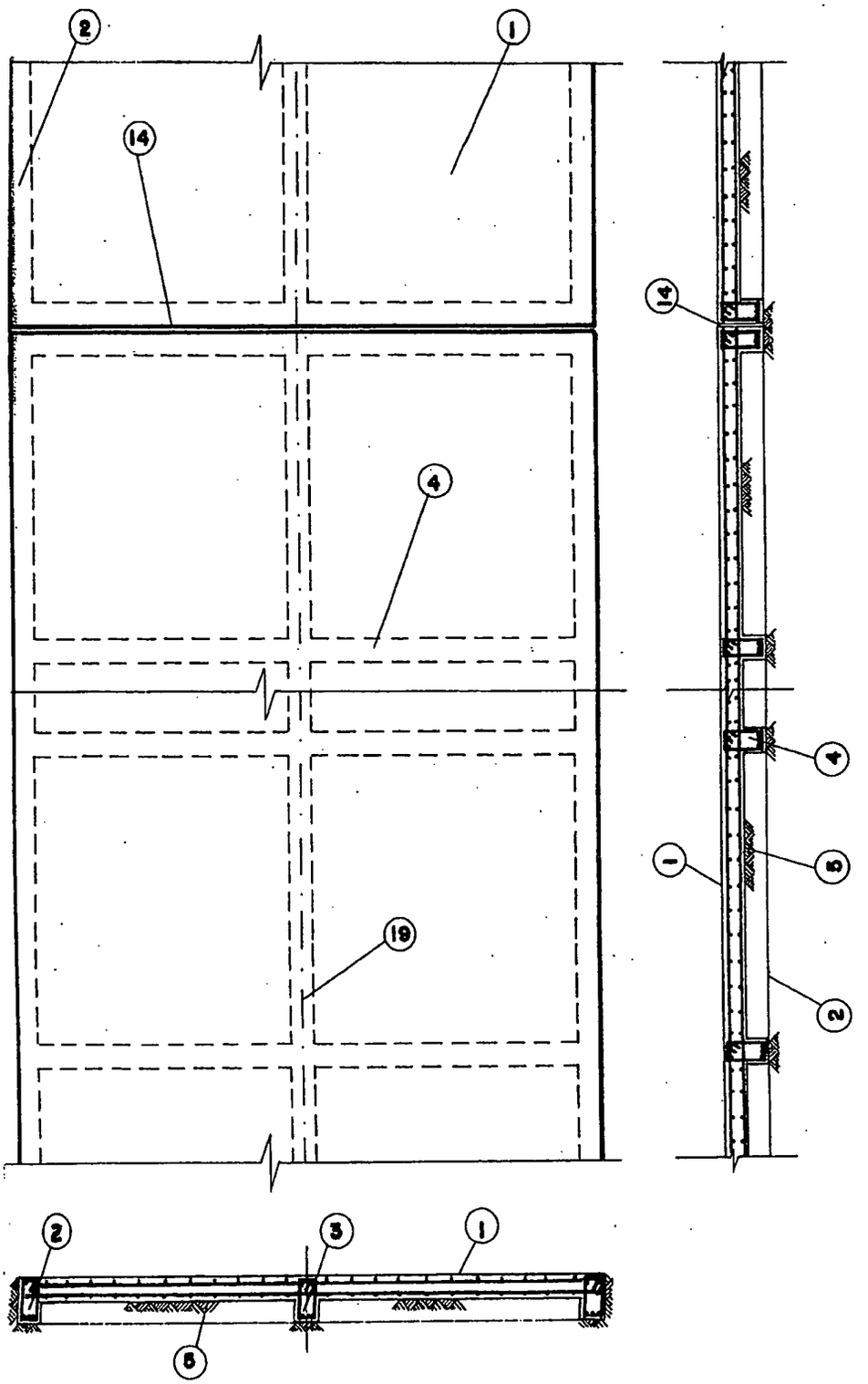

FIGURA I

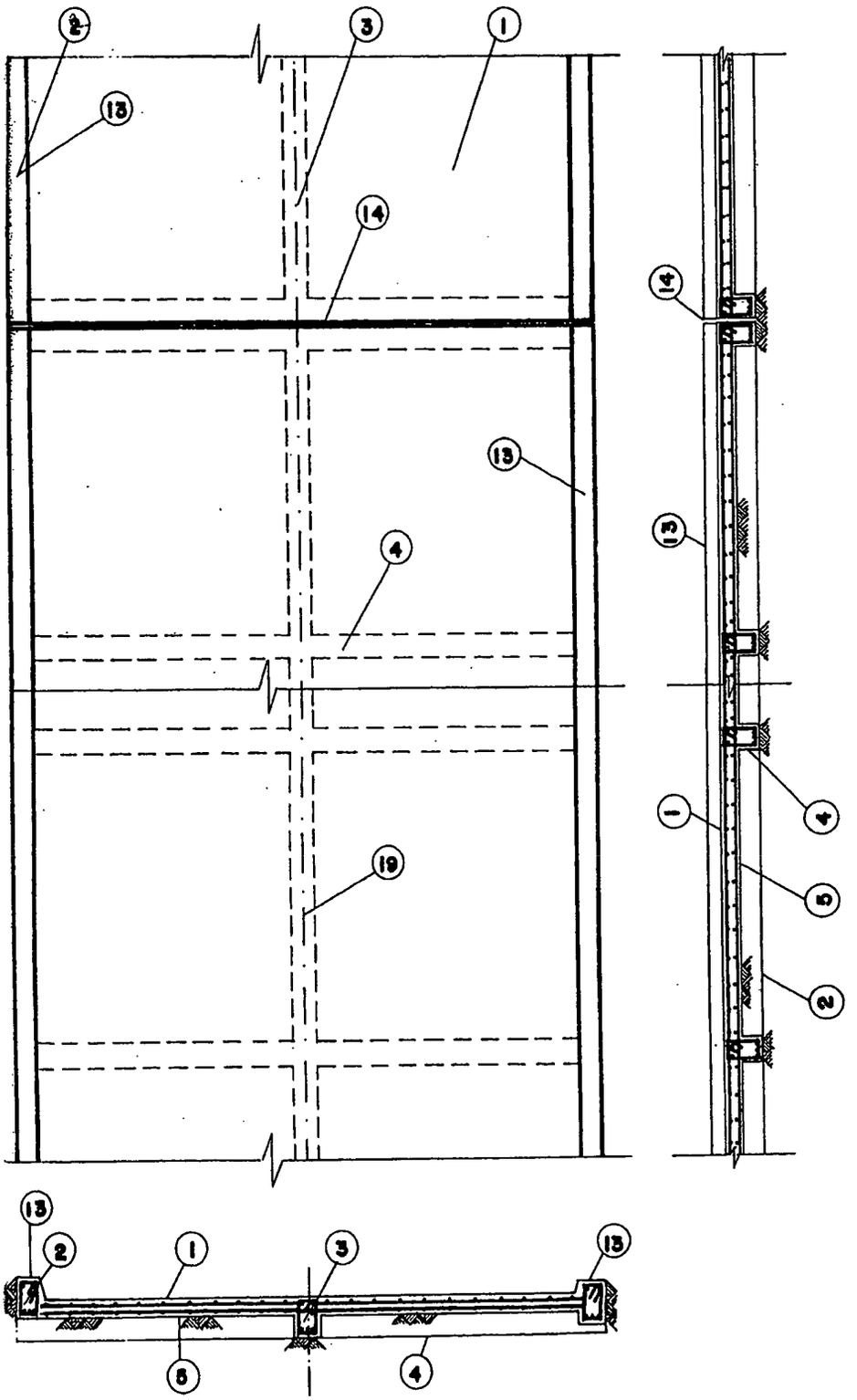

FIGURA 2

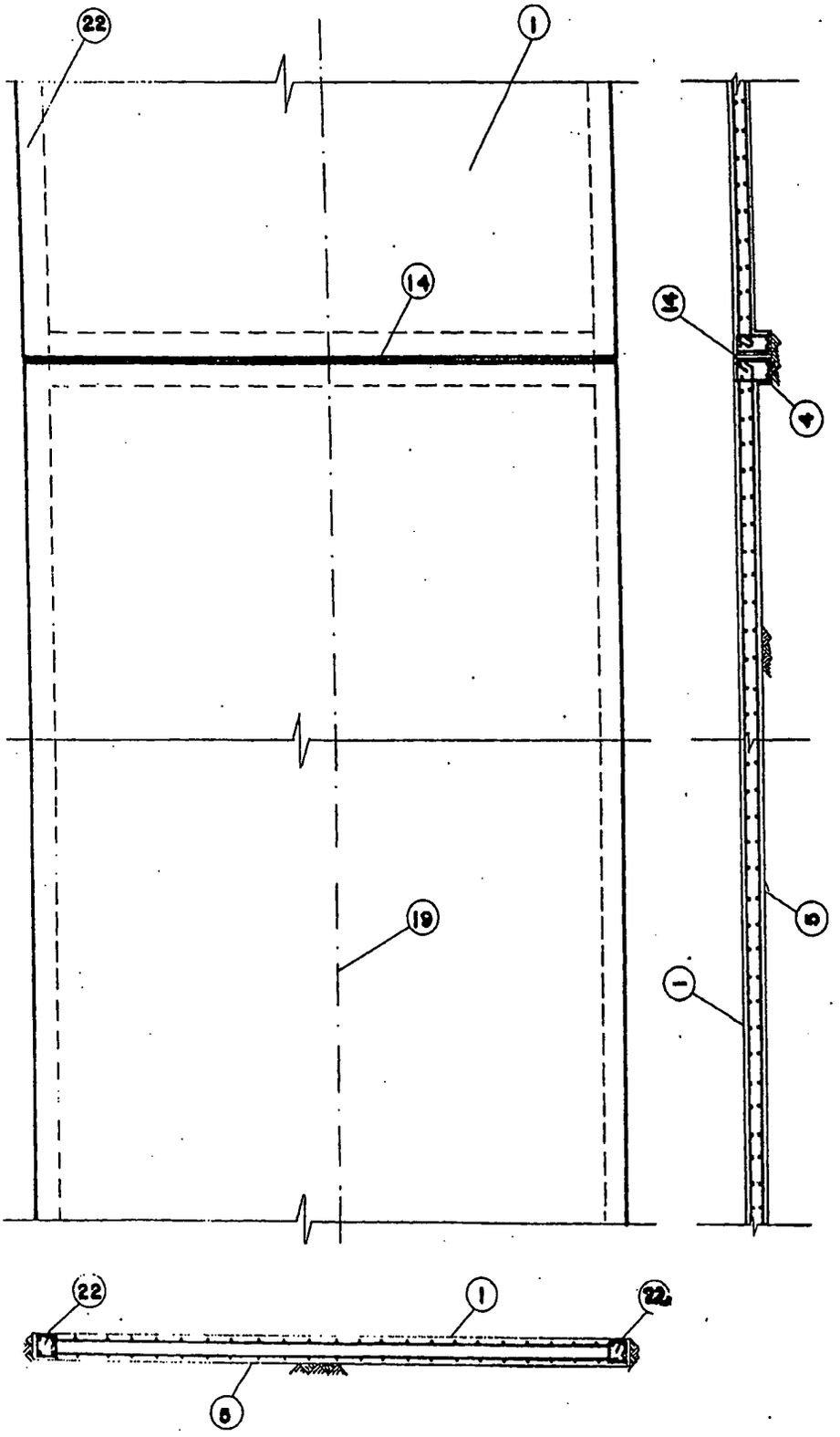

FIGURA 3

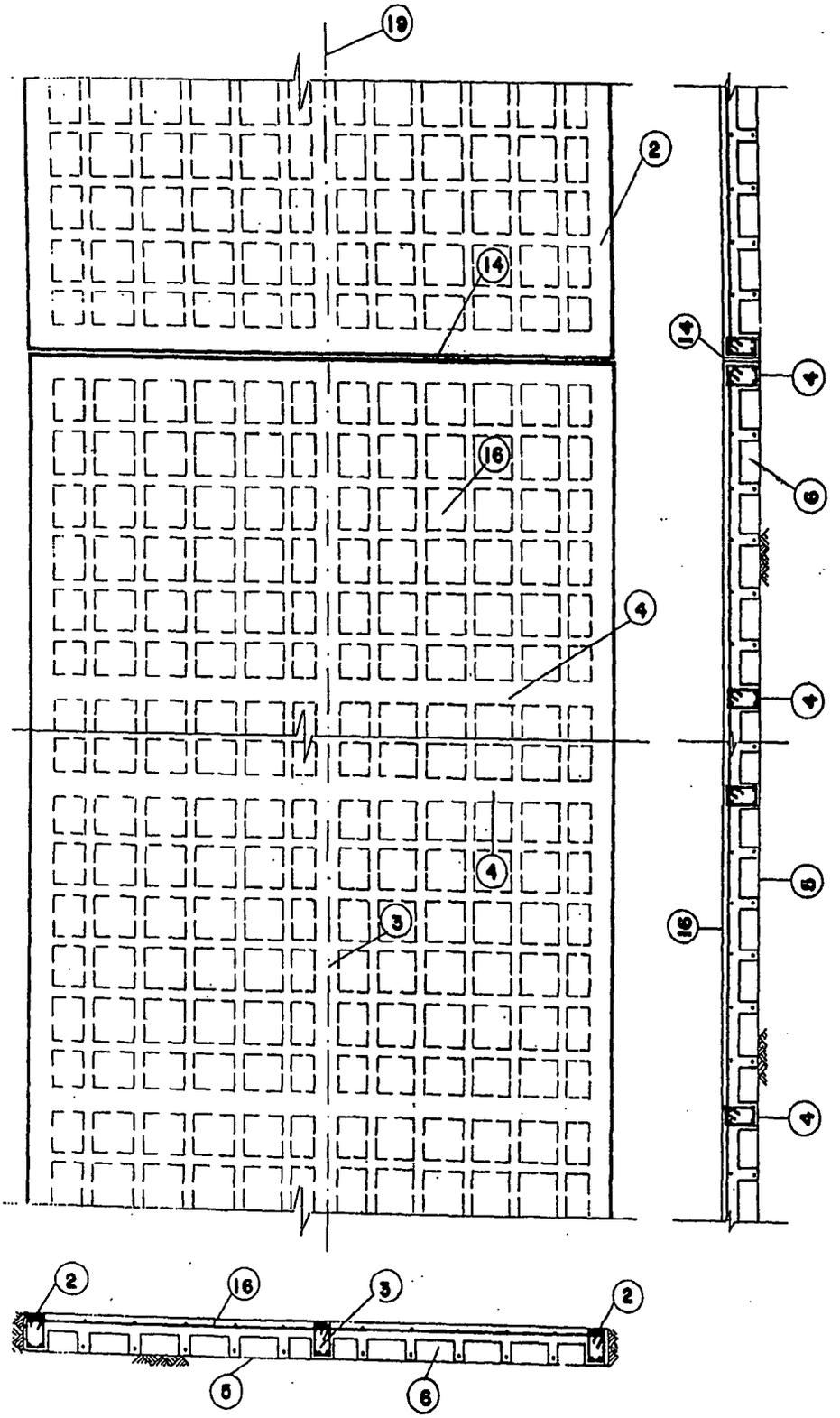

FIGURA 4

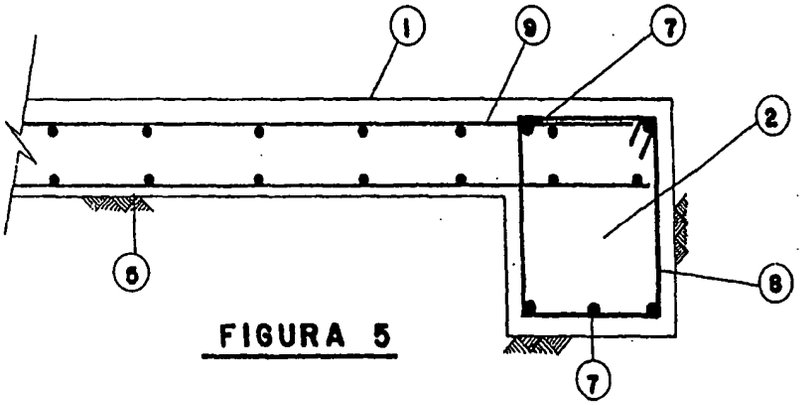

FIGURA 5

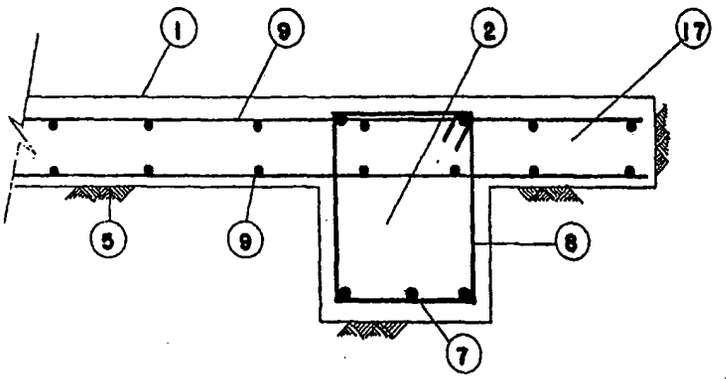

FIGURA 6

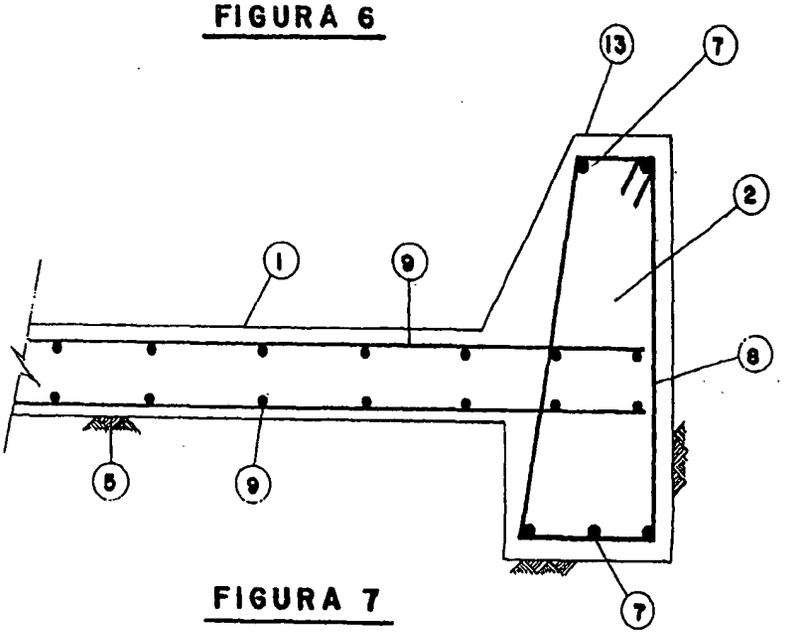

FIGURA 7

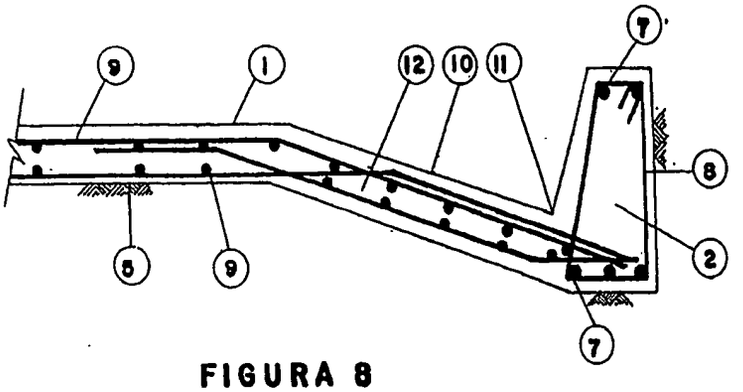

FIGURA 8

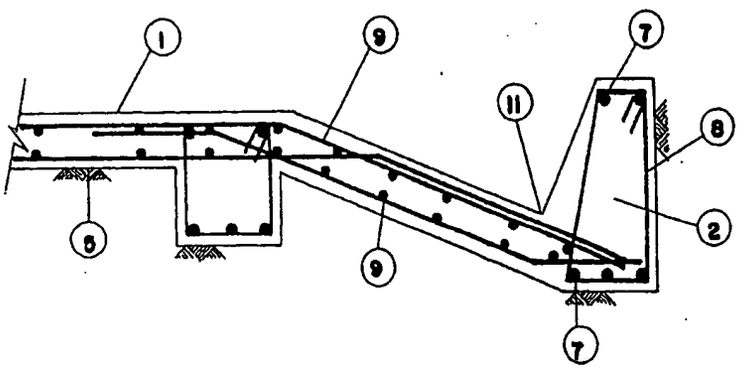

FIGURA 9

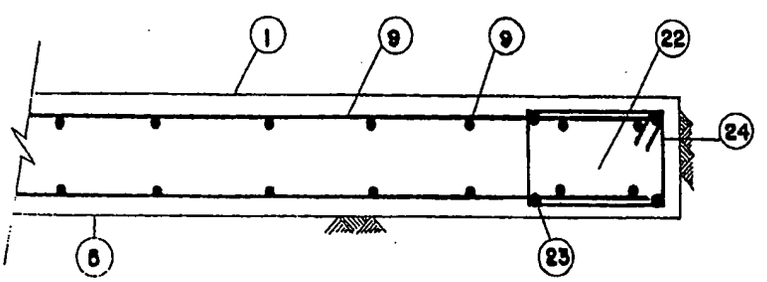

FIGURA 10

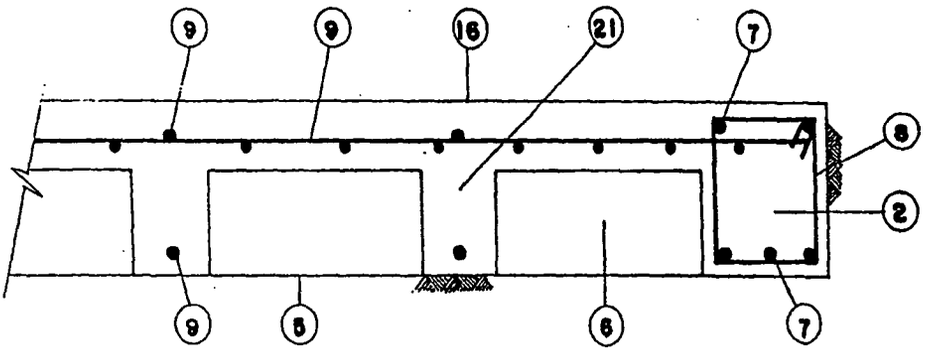

FIGURA 11

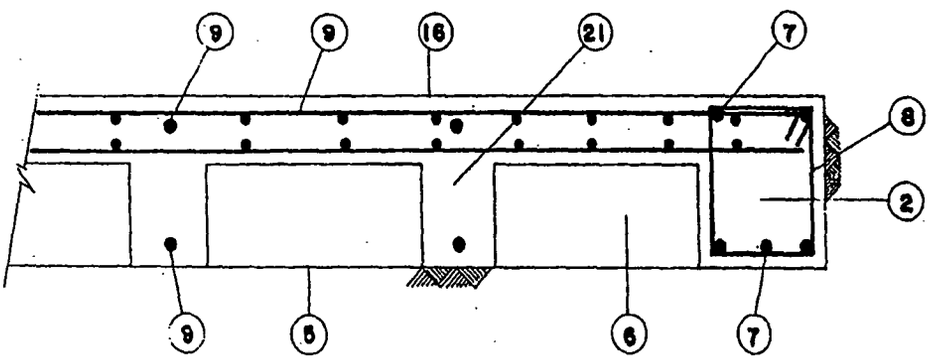

FIGURA 12

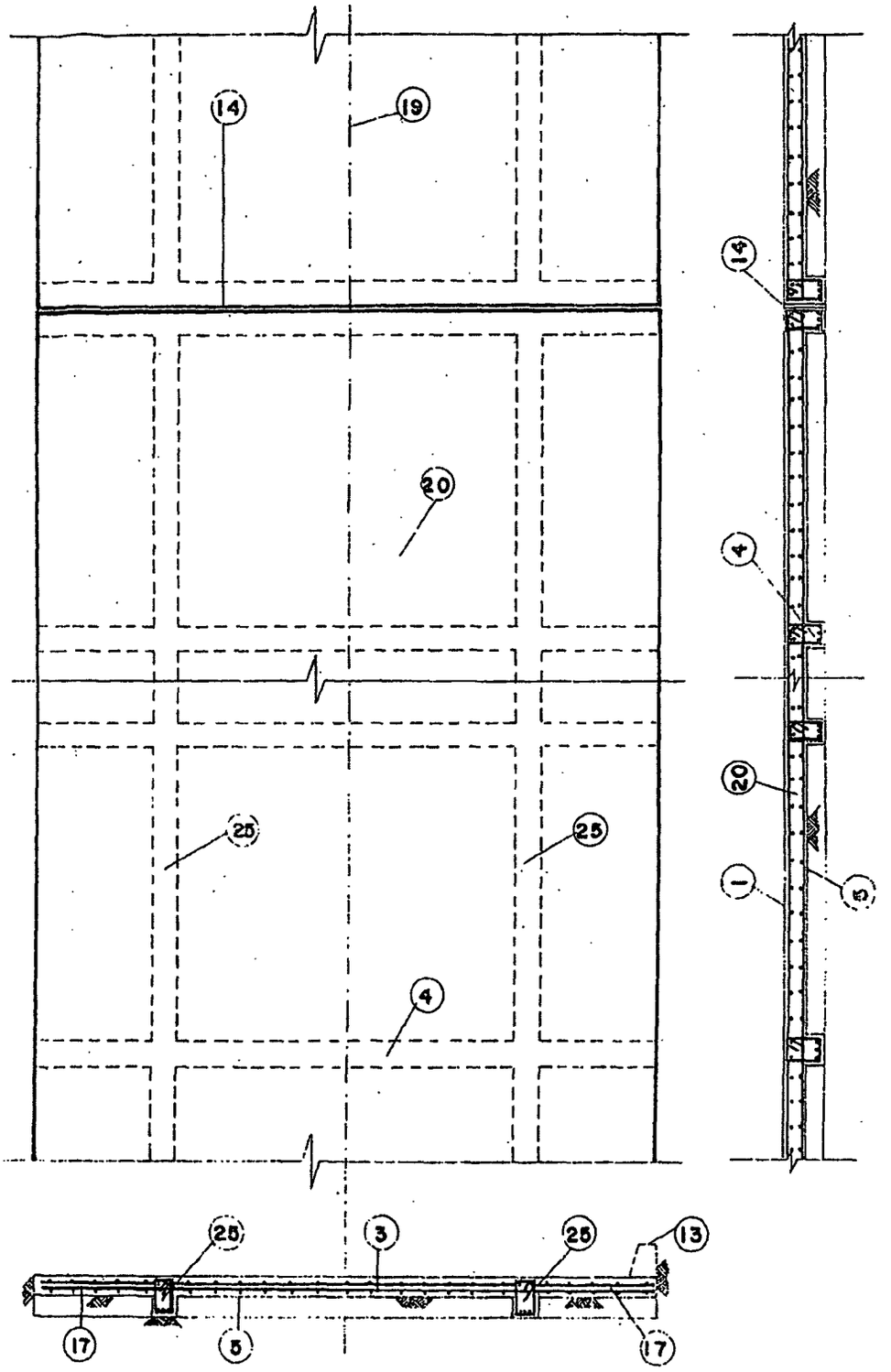

FIGURA 13

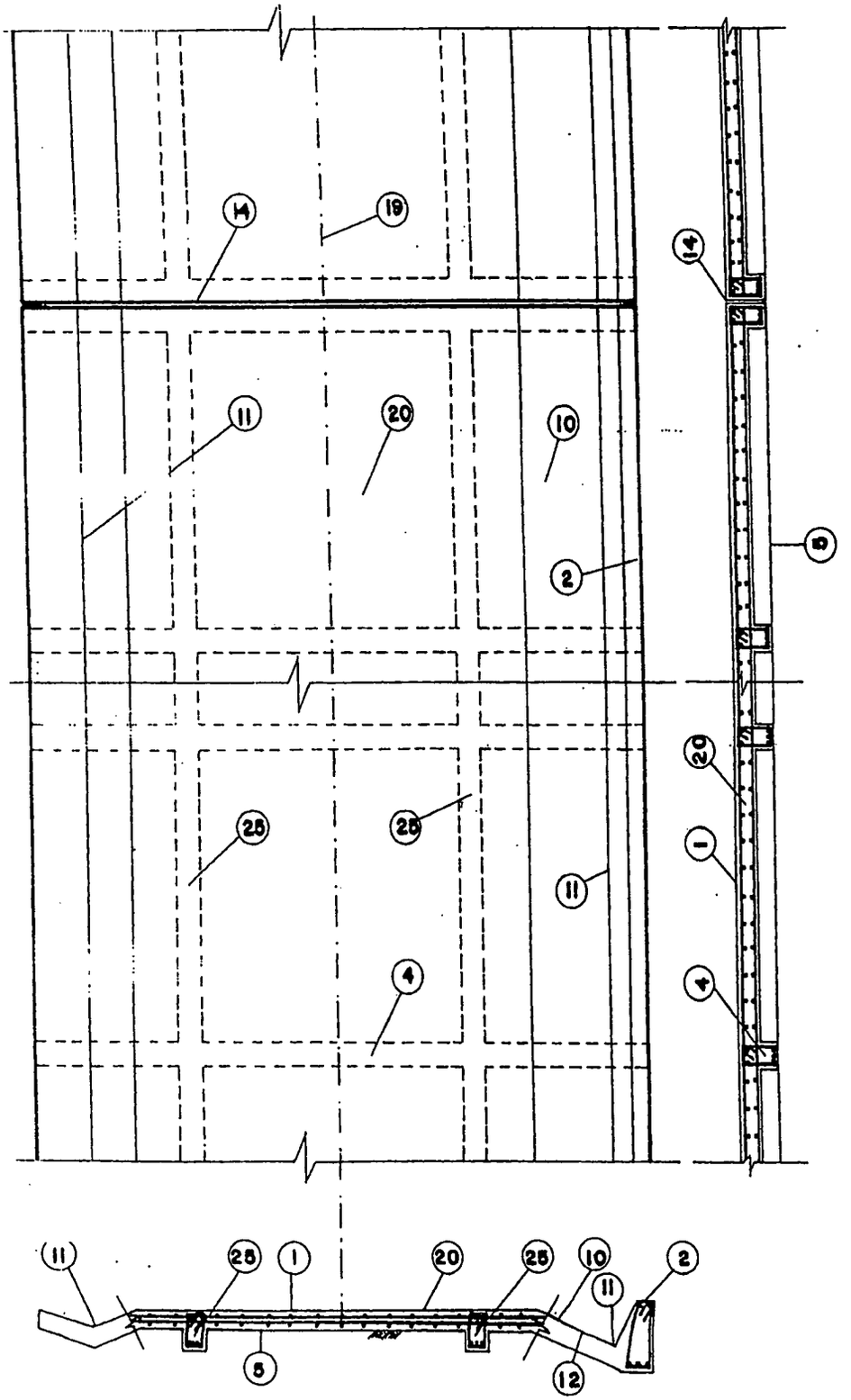

FIGURA 14

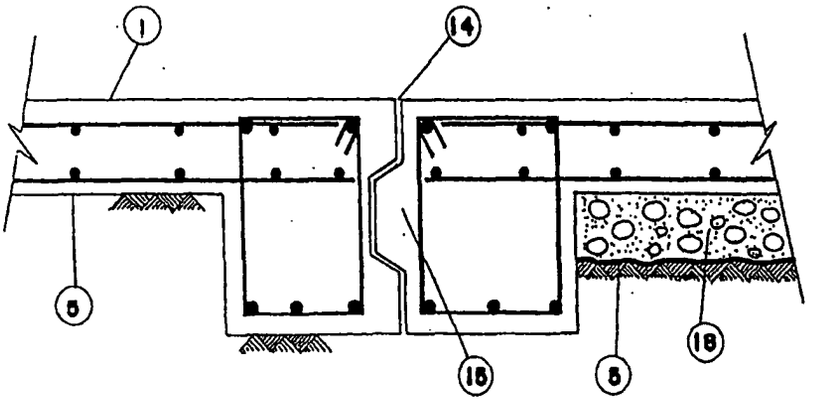

FIGURA 15

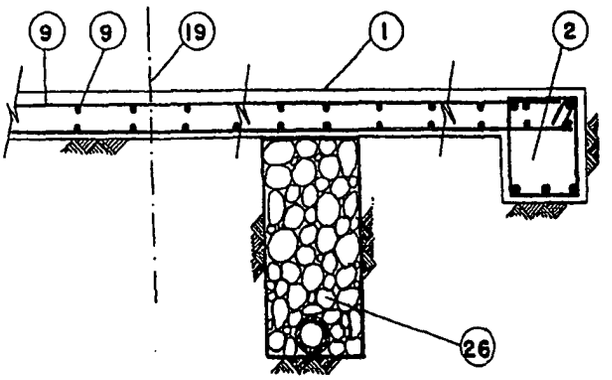

FIGURA 16