

Nov. 22, 1927.

1,650,554

B. H. WAIT

PAVEMENT AND PROCESS OF CONSTRUCTING PAVEMENTS

Filed Dec. 18, 1925

2 Sheets-Sheet 1

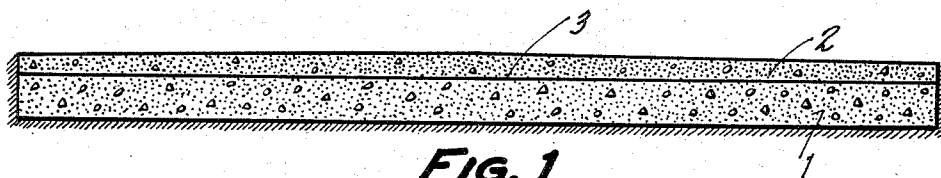


FIG. 1

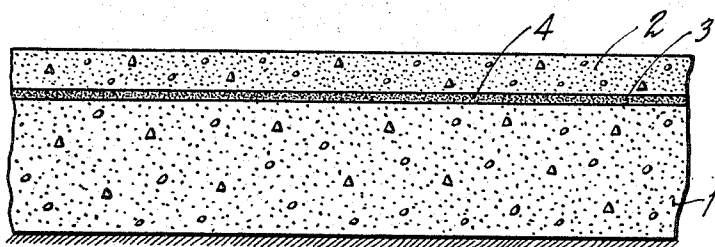


FIG. 2

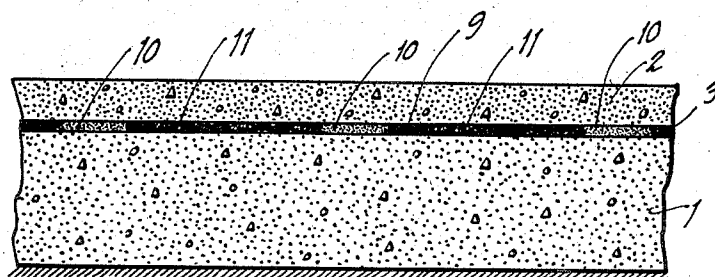


FIG. 3

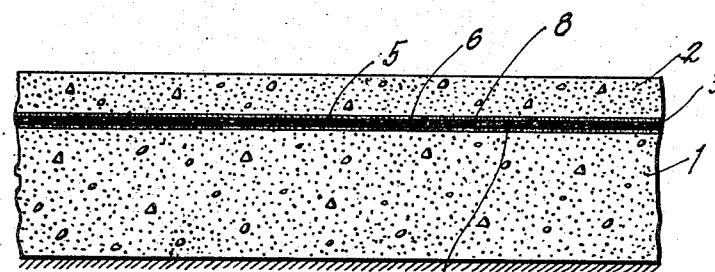


FIG. 4

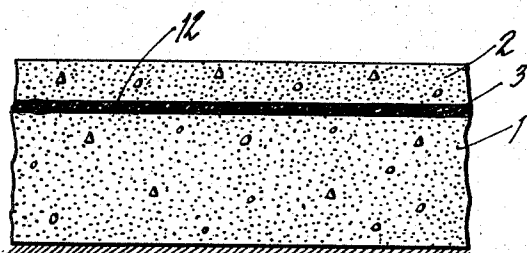


FIG. 5

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2 Sheets-Sheet 2

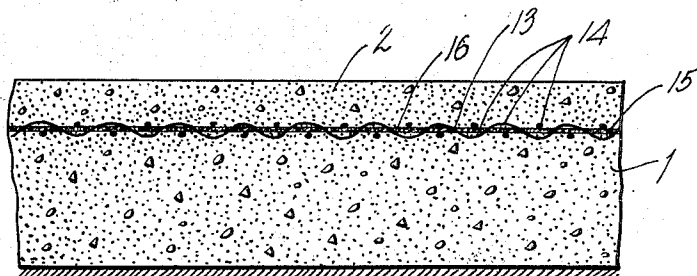


FIG. 6

FIG. 7

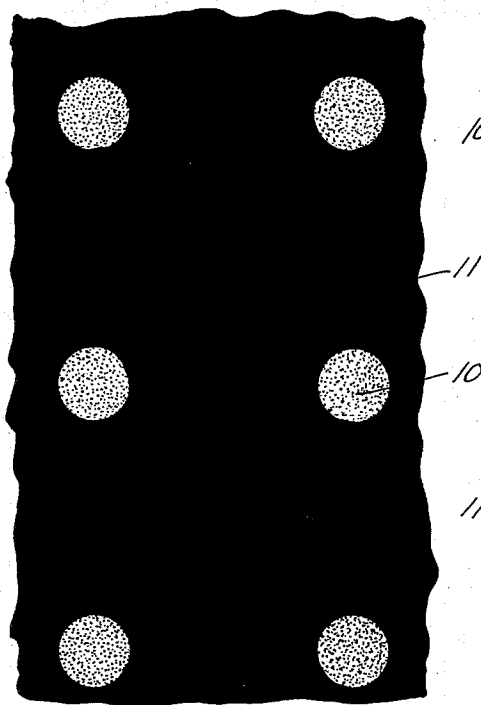
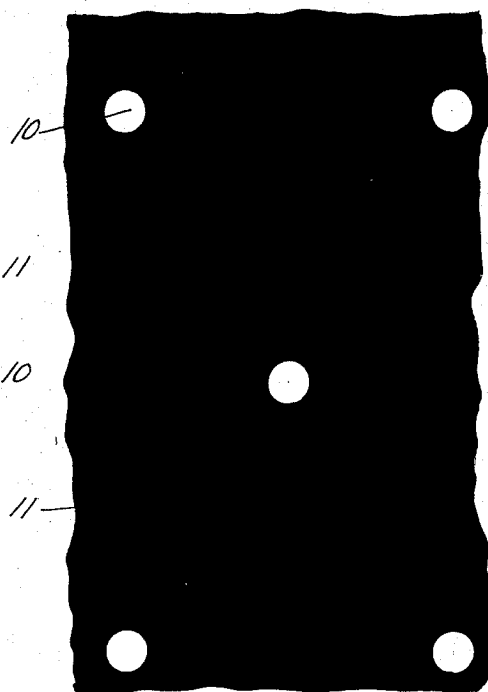


FIG. 8



LEGEND

- Non-absorbent-not adhering to concrete.
- Porous or absorbent.
- Perforation or opening.

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UNITED STATES PATENT OFFICE.

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PAVEMENT AND PROCESS OF CONSTRUCTING PAVEMENTS.

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My invention relates to pavements for roadways and the like, and more particularly to pavements which are constructed of two or more layers of plastic material, such as concrete. It relates to a new type of pavement comprising separable layers of plastic material in which a certain predetermined degree of adherence is provided between the layers, either by direct bond, so that the pavement is substantially integral, or by indirect bond through an intermediate substance placed between the layers. It also relates to a new process of constructing concrete pavements comprising separable layers whereby the whole pavement is constructed in a continuous operation from subgrade to wearing surface.

Concrete pavements, because of their stability and economy are widely used not only for the construction of country or interurban highways, but also for city and village streets. The accepted practice, at the present time, is to construct the pavement as a monolithic slab, from sub-base to the grade of the finished pavement, and of such thickness as may seem necessary to withstand the traffic to be carried thereon. Where a pavement is constructed in this manner through a territory which is thickly populated, such as a city or village, it must be constructed to the established grade line of the street. And where a pavement has once been laid and the street grade established thereby, it is at least impracticable if not impossible thereafter to change the elevation of the surface of the pavement.

For this reason, when a concrete pavement of the present type proves inadequate for the traffic imposed upon it, it is necessary to remove the whole of the pavement and replace it with a new pavement from the sub-grade to the surface. This, of course, may be avoided by constructing the pavement in two layers according to well known methods so that there is substantially no bond between the courses. Such a pavement, however, requires the top or wearing course to be of some considerable thickness to provide the required strength, and the resulting structure is not comparable in strength with a monolithic pavement of the same depth. Therefore, a two course concrete pavement which can be laid in a continuous operation; which will have substantially the same strength as a strictly monolithic pavement of

the same depth; and from which the upper or wearing portion can be removed and replaced from time to time, as necessary, without the destruction of the lower or base portion, will prove most economic and advantageous.

The primary object of my invention therefore is to provide a concrete pavement and a method by which it can be economically constructed in layers so that the top course can be removed and replaced, either in whole or in part, without damage to the base course. Another object of my invention is to provide a two layer concrete pavement and a method of constructing the same whereby the entire pavement may be laid in a continuous operation, but in which the adherence of the two layers may be controlled to any desired degree. Another object of my invention is to provide a two layer concrete pavement in which the degree of adherence between the top and bottom course, and hence the integrity of the pavement, may be closely controlled so that it will be possible to construct it of substantially the same strength as a single layer pavement having the same thickness, and yet have the top course such that it may be separated from, and without injury to the bottom course. Another object of my invention is to provide a method of constructing a two layer concrete pavement by means of which the surface or wearing course may be placed upon the base or foundation course without waiting for the latter to set, and yet to provide a pavement from which the surface or wearing course may be removed and replaced, after both courses have set, without injury to the lower course.

Still another object of my invention is to reduce the cost of concrete pavements by providing a design and methods of construction which permit the use of a larger proportion of low grade aggregate than is possible under the present practice and yet provide a pavement highly resistant to wear and which is less liable to crack than those constructed by the methods now in use.

The means by which I accomplish these and other objects is, broadly, the interposition between the top and bottom courses of a medium of such a character as will regulate, or eliminate entirely the adherence between the courses. In constructing a complete pavement (top and bottom course), it is contemplated that the top course will be placed

before the bottom course is set and that the adherence will be controlled to the desired degree by placing upon or applying to the bottom course a suitable medium or agent, thus permitting the whole pavement to be laid substantially in one continuous operation.

In the drawings—

Fig. 1 is a typical, small scale section of my concrete pavement;

Fig. 2 is an enlarged, fragmentary cross section of my pavement showing the interposition of a partially absorbent medium which provides adherence to a limited degree over the entire pavement;

Fig. 3 is an enlarged, fragmentary section of my pavement showing the interposition of a medium which is partially impervious and partially absorbent, giving a limited or close adherence over portions of the area of the pavement, and less or no adherence over other areas;

Fig. 4 is an enlarged, fragmentary section of my pavement showing the interposition, between the layers of pavement, of a medium having absorbent characteristics in contact with the upper and lower layers respectively, separated by an impervious or non-absorbent medium;

Fig. 5 is an enlarged, fragmentary section of my pavement showing the interposition between the upper and lower layers of a medium which is impervious or non-absorbent, and non-adherent to either layer.

Fig. 6 is an enlarged, fragmentary section of my pavement showing the interposition of an impervious layer having a metal mesh incorporated therewith and projecting into both the upper and lower layers of concrete to provide a mechanical bond between the courses;

Fig. 7 is a plan view of the type of medium illustrated in Fig. 3;

Fig. 8 is a plan view of a modified type of medium illustrated in Fig. 3.

In the drawings, 1 represents the lower or foundation course, and 2, represents the upper or wearing course. 3 represents, generally, the medium interposed between the courses. In general, the medium, 3, will comprise a sheet or thin mat of paper, cloth, felt, wire, or other similar fabric, or fabric like material, or a combination of these such, for example, as paper or fabric interwoven with wire mesh so that the wire will project into either or both the top and bottom courses and give, in the latter instance, a mechanical bond. However, in its broadest aspects, it is to be understood that my method of controlling the adhesion between the upper and lower layers, is not in any sense limited to the use of a fabric or a fabric like material, and it is contemplated that the adherence may be controlled by the spraying, painting, or covering of the green con-

crete of the base course, or portions thereof, with any animal, vegetable, or mineral compound or a combination of these or any of them which will insure the easy separation of the courses and at the same time give the necessary adhesion to meet traffic and other conditions in connection with the work.

Where a limited adherence is desired over the entire pavement area, an absorbent or partially absorbent fabric, 4, such as paper, cloth or felt of the desired thickness to regulate the adhesion, may be used as shown in Fig. 2. Such a medium will partially absorb the moisture from the concrete leaving the surface harder and denser than it would otherwise be, and yet will provide a cleavage surface along which the layers may be separated by means of a steam shovel or by other well known construction methods.

The medium, 5, (see Fig. 4) is a modified form of construction giving a certain degree of adherence over the entire pavement area. The portions, 6 and 7, of the medium, 5, which are in contact with the upper and lower layers of the pavement, respectively, are absorbent. These absorbent layers are separated by the impervious and non-porous layer, 8.

Where it is desired that the upper and lower layers should have a certain adherence over some portions thereof, and no or practically no adherence over other portions, a medium, 9, of the character shown in Fig. 3 may be used.

The medium, 9, may comprise a fabric or fabric like material having openings or penetrable or absorbent areas, 10, and impenetrable or non-absorbent areas, 11, therein. Such a fabric may obviously be prepared by treating certain areas of a porous or absorbent fabric, such as paper, cloth or felt with a substance which will prevent the penetration of the water and adherence to the concrete; or it may be prepared by perforating a waterproof or non-adhering fabric or fabric like material to permit a direct bond of the courses through the perforations. Such a partial adherence of the concrete slabs may also be obtained by spraying, painting, or covering portions only of the green concrete base with any substance which will prevent adhesion over those areas.

Where it is desired that the upper and lower layers of concrete shall have no connection or adhesion, a medium, 12, such as illustrated in Fig. 5, may be used. The medium, 12, may comprise a sheet or thin mat of impervious material such as paper, felt, cloth or the like treated with any substance which will prevent adhesion to the green concrete. On the other hand, adhesion may be prevented by spraying, painting, or covering the green concrete base with any substance which will prevent the adhesion of the

top course to the lower course and which will provide a plane of cleavage along which the layers may be separated.

Where a comparatively strong mechanical bond is desired between the courses and yet it is desirable for purpose of future separation that the bond shall be of less strength than the concrete itself, a medium, 13, such as illustrated in Fig. 6 may be used. The medium 13, may comprise a waterproof or nearly waterproof fabric or paper, 16, interwoven with steel mesh, 14, so that the mesh will project into both courses as shown.

In addition to the advantages above enumerated, a pavement of this character may be colored at very small expense because the coloring matter need only be incorporated with the top course; the separation of the top and bottom courses will permit the bottom course to crack without the transmission of stress to the surface course; and furthermore, the use of an intermediate layer regulating the degree of adhesion between the courses will provide the necessary support for the surface course, and yet, at the same time, provide a certain amount of resiliency in the top course which will reduce, if not eliminate the destruction due to impact, and result in a resilient sound absorbing pavement.

In constructing my pavement it is contemplated that the pouring of both courses be carried on as a substantially continuous operation. In other words, by my method of construction, the foundation course is first laid to the required depth, then, without waiting for this course to set, a medium having the desired characteristics for controlling the adhesion of the courses is placed upon or applied to the foundation course, and the top or wearing course is immediately poured and finished. Thus, by my method of construction there is no waste of time and the entire pavement is completed at once.

The pavement may, of course, be plain or reinforced, and may be built with longitudinal or transverse joints, or both, as conditions may require.

It would, of course, be possible to construct a two course pavement by methods now well known in the art in which a cheap low grade aggregate is used in the bottom course and a high grade aggregate in the top course, thus effecting substantially the same saving in materials as my method. However, the old methods of constructing a pavement with a removable wearing course do not contemplate the laying of a top course until the bottom course has set, nor do they contemplate the application to the bottom course at any time, either before or after the setting thereof, of a medium which will control or regulate the adherence of the two courses or the integrity of the pavement.

The application of a layer of bituminous material to an old pavement before the laying of a top course thereon is well known in the art, and it has been proposed to produce a complete separation of the courses by the interposition of paper or similar means between the courses. Such is not my invention which proceeds upon the discovery that a two course pavement may be constructed in a continuous operation by placing a suitable medium upon the bottom or lower course before the setting thereof, and that a pavement having substantially the beam strength of a monolithic pavement with the advantages inherent to a removable wearing course may be constructed by choosing a medium for interposition between the courses which will permit a certain predetermined bond between the courses.

While I have described my invention as applicable to highway construction, it is obvious that it is equally useful when applied to the construction of floors or pavements in buildings, platforms, sidewalks, bridge floors, and the like. I therefore wish it understood, that the words which I have used in describing my invention and its application are words of description and not of limitation, and that changes within the purview of the appended claims may be made without departing from the scope and spirit of this invention.

What I claim is—

1. A pavement or the like comprising vertically disposed layers of cement concrete composed of similar materials, and an intermediate medium providing spaced zones of substantial area adapted to prevent an integral bond between said layers and other zones adapted to permit such a bond; whereby is formed a substantially rigid monolithic structure adapted to act as a unitary slab under normal load and temperature stresses but having therein a stratum of comparative weakness along which the monolith may be generally cleft or split.

2. A pavement or the like comprising vertically disposed layers of cement concrete composed of similar materials, and an intermediate fabricated medium of a character generally adapted to prevent adhesion of said layers but having spaced perforations therein permitting an intermixing of the materials of said layers and the formation of integral bonds therebetween.

3. A pavement or the like comprising vertically disposed layers of cement concrete generally separated from each other but having the materials of adjacent layers intermixed at spaced intervals to form integral bonds therebetween.

4. A pavement or the like comprising vertically disposed layers of cement concrete having similar elastic properties and generally separated from each other but hav-

- ing spaced integral connections; the connections being sufficient in number and strength to cause said pavement to function as a monolithic beam under normal load and temperature stresses, but not sufficient to prevent the pavement being cleft or split along the stratum between said layers.
5. A pavement or the like comprising layers of cement concrete having similar elastic properties and generally spaced from each other by a fabricated medium having spaced zones of substantial area impervious to mortar, and other zones pervious to mortar and adapted to permit the formation of integral bonds between said layers; the cross-sectional area of said bonds being sufficient to unite said layers into a monolithic structure functioning as a unitary slab under normal load and temperature stresses.
6. The method of constructing a monolithic concrete pavement having a stratum of weakness therein which comprises placing a lower course of cement concrete, covering spaced portions only of the surface of said course with a substance adapted to pre-

vent adherence of concrete thereto, and thereafter, and before the setting of said lower course, placing an upper course over the whole.

7. The method of constructing a monolithic concrete pavement having a stratum of weakness therein which comprises placing a lower course, placing thereover a fabricated medium having portions of substantial area impervious and other portions pervious to mortar, and thereafter placing an upper course over the whole and before the setting of the lower course.

8. The method of constructing a two course monolithic pavement having a cleavage stratum therein which comprises placing a lower course, placing thereover a fabricated medium having openings therein of sufficient size to permit an intermixing of the materials of said course through said openings, and thereafter placing an upper course over the whole and before the setting of the lower course.

BERTRAND H. WAIT.