Sept. 9, 1924. 1,507,868

R. C. STUBBS

PROCESS OF MAINTAINING THE MOISTURE CONTENT CONSTANT IN SUBGRADES OF PAVING AND THE LIKE

Filed Jan. 7, 1924

Fig. 1.

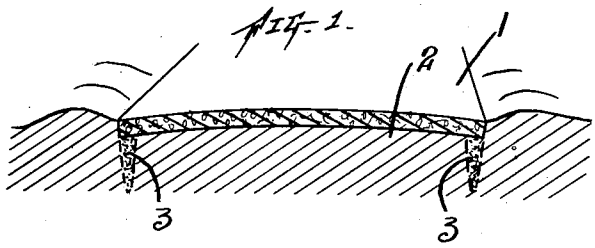


Fig. 2.

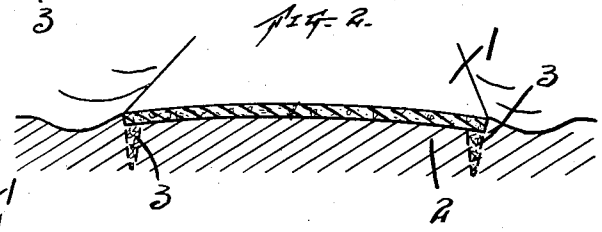


Fig. 3.

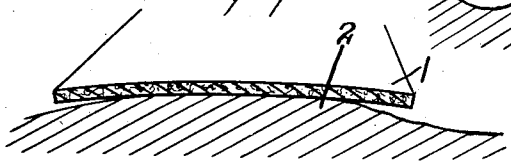


Fig. 4.

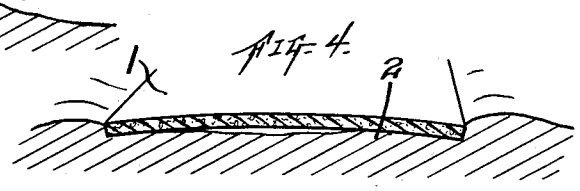


Fig. 5.

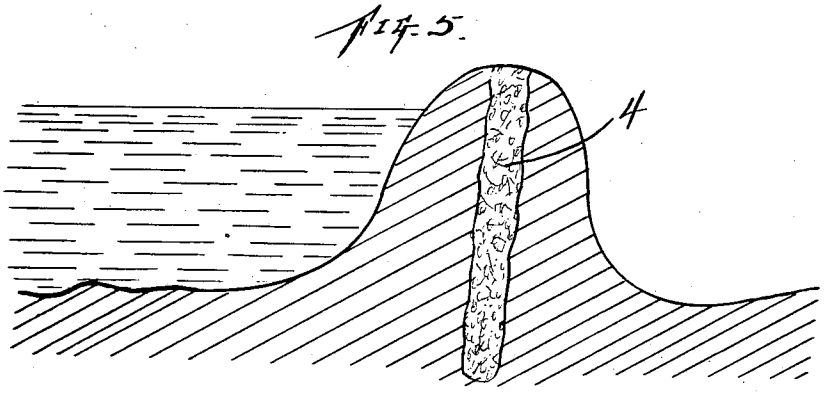
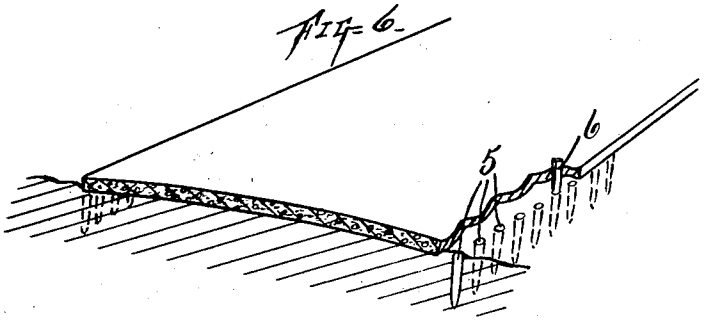


Fig. 6.



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UNITED STATES PATENT OFFICE.

ROBERT C. STUBBS, OF DALLAS, TEXAS.

PROCESS OF MAINTAINING THE MOISTURE CONTENT CONSTANT IN SUBGRADES OF PAVING AND THE LIKE.

Application filed January 7, 1924. Serial No. 684,779.

To all whom it may concern:

Be it known that I, ROBERT C. STUBBS, a citizen of the United States, residing at Dallas, in the county of Dallas and State of Texas, have invented certain new and useful Improvements in Processes of Maintaining the Moisture Content Constant in Subgrades of Paving and the like, of which the following is a specification.

My invention relates to paving for streets, roads and the like; and more particularly to the foundation or sub-grade for paving and to a process of stabilizing subgrades for paved streets and roads; and the object is to provide a process of conserving the water content in the subgrades to prevent earth movement, either by contraction or expansion and this process relates particularly to a process of forming nonabsorbent walls of water repellent material and natural earth so that the water content may be constant in the required area, as under street and road paving, and in walls for dams, and other places where it may be necessary to prevent capillary attraction in the earth. The objects sought are to be accomplished by providing a wall of earth impregnated with a water repellent material which will resist capillary attraction and thus prevent the passage of moisture or water through the required wall.

Other objects and advantages will be fully explained in the following description and the invention will be more particularly pointed out in the claims.

Reference is had to the accompanying drawings which form a part of this application.

Fig. 1 is a cross-section of a paving slab and the subgrade, showing the location of the water repellent walls which are adapted to keep out excess moisture.

Fig. 2 is a similar view showing the water repellent walls adapted to keep original moisture in the earth under the paving in case the earth is shrunken by drought.

Fig. 3 illustrates the condition of the subgrade caused by the drought and which causes the cracking of the pavement near the edges.

Fig. 4 illustrates the condition of the subgrade caused by excessive moisture coming under the edge of the paving.

Fig. 5 illustrates the improvement applied to a dam.

Fig. 6 illustrates one method of preparing an insulating wall.

Similar characters of reference are used to indicate the same parts throughout the several views.

In the drawings the slab of paving 1 rests on a subgrade 2 of earth of ordinary preparation. The problem to be solved is to keep the water content in the subgrade constant so that there will be no expansion and no contraction. It is well known that the earth is porous and will absorb water by capillary attraction and that moisture will travel from a more moist earth to a less moist earth. In order to prevent the movement of the moisture of the earth in a subgrade, it is necessary to provide some means to prevent the travel of the moisture under the subgrade. In order to make such problem possible a means had to be provided for accomplishing this object without changing the design, plans, specifications, construction, location, grade cuts or fills, or cost now prevailing. I have discovered or invented a way of accomplishing such object. I do this by making a nonabsorbent wall of particles in a body of earth at required locations and required depths and such wall is made of water repellent substance which will render impotent the force of capillary attraction. Walls 3 of common earth or dirt may be treated by coating the surface of individual particles with oil or an oily substance or other water repellent, and when so treated, the pores in the dirt will no longer absorb moisture by capillary attraction. Such wall will be as impervious to the passage of water as though it was a solid wall. Trenches deep enough for the walls, or to the required depth may be made in the earth at the proper location under the edge of the intended paving. The earth or dirt can be treated with the oil or oily substance or other water repellent material and then placed in the trenches with the required pressure to make the wall material more or less firm. When the paving is placed on the subgrade to form the slab 1, the water content in the subgrade will remain constant because the moisture cannot escape and no moisture can pass through the walls 3 to and under the subgrade.

The load bearing strength and volume of a mass of particles will remain constant if

water content be constant. With a wall structure of water repellent material provided as above set forth, the particles inclosed will remain indefinitely in the moist state in which they were installed and inclosed. The improved web wall of nonabsorbent structure will be flexible enough to yield to perfectly comfortable embedment of the slab under its own weight while seasoning.

Fig. 6 illustrates another way of making a wall of nonabsorbent properties. A series of holes 5 may be formed in a row or several rows by driving a rod or stick 6 down the required depth and then filling the holes with oil or oily substance or some water repellent substance. The substance put in the holes will be readily absorbed by the earth. If there is a hole left, it will be filled and the earth made firm by driving the next hole.

Fig. 5 illustrates the invention applied to a dam. The nonabsorbent wall 4 separates the wet earth or material from the dry earth.

Fig. 1 illustrates the protection provided by the nonabsorbent wall, as compared with the paving which is not provided with the protecting web wall 3. Paving troubles are caused by the earth expansion on account of excess moisture. This will lift the outer edges, as shown in Fig. 4, and the paving will be cracked along the central part. When the paving is provided with the web walls, the earth, in rainy seasons or other moisture producing causes, will rise up on both sides of the paving but not under the edges.

Fig. 2 illustrates the protection provided by the web walls in dry seasons when the earth shrinks or contracts, as compared with the paving shown in Fig. 3 which has no web walls. Under such conditions as shown in Fig. 3, the paving will be cracked along the edges, because the supporting earth will leave portions of the paving unsupported. If the paving is provided with the web walls, as shown in Fig. 2, the earth under the paving will not contract because the water content will remain constant.

The nonabsorbent web walls will also protect paving against damage by frost or freezing weather conditions.

The improvement herein set forth is useful in other purposes than those above set forth. Subterranean foundations need little assistance in maintaining a stable state of moisture as abundant moisture is nearly always present and about constantly maximum for the earth density at such locations. Such foundations may be affected by powerful water courses under pressure and such water courses or veins may be deflected by placing the water repellent nonabsorbing web walls into the earth to the required depth at small cost. Near surface water courses over a substratum of rock or firm clay may be arrested and diverted around a given area of many acres by interposing insulating walls of water repellant properties. Well supply may be strengthened to guard against times of drought by injecting the web walls in the water course beyond the well. This would cause water to rise in the well.

It is obvious that this method of maintaining moisture content under the paving will add very little to the cost of the paving as only a narrow wall is necessary. The advantage of such protection will be apparent by observing the large proportion of paving which is damaged by earth movement, or expansion and contraction, which always result from changes in the moisture content.

What I claim, is,—

1. A process of making the moisture content constant in a subgrade under paving by forming web walls of earth on both sides of the boundaries of the subgrade by impregnating continuous sheets or portions of earth below the paving at the boundaries thereof with a water repellant material and making the web walls impervious to passage of water.

2. A process of preventing capillary attraction to and from subgrades of earth under paving which consists in impregnating sheets or portions of earth below the paving at the boundaries thereof with a water repellant material.

3. A process of rendering moisture content constant in a subgrade under paving which consists in forming the boundaries of the subgrade of non-absorbent walls by impregnating sheets or portions of earth below the paving at the boundaries thereof with a moisture repellant material for preventing the travel of the water by capillary attraction.

4. The combination of a paving with continuous non-absorbent walls located under the paving at the boundaries thereof, said walls consisting of sheets or portions of earth impregnated with water repellant material.

In testimony whereof, I set my hand, this 27th day of December, 1923.

ROBERT C. STUBBS.