May 10, 1932. N. C. JOHNSON 1,857,511

TOP SURFACE OF CONCRETE AND THE LIKE AND METHOD OF FORMING THE SAME

Filed Aug. 24, 1928

Fig. 1.

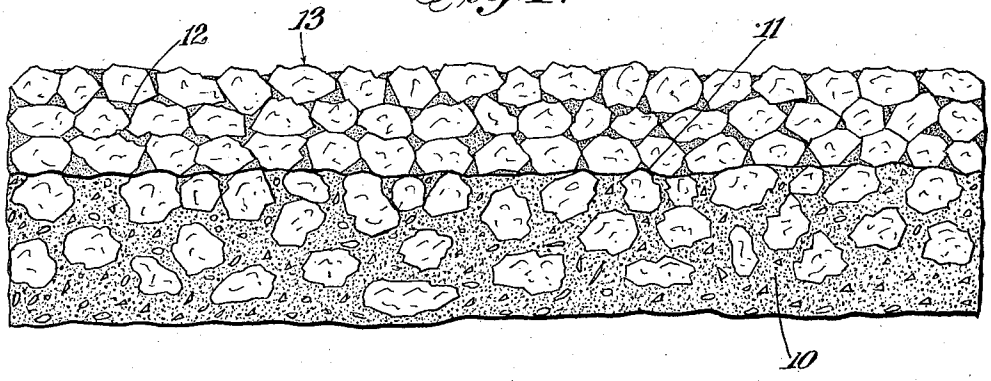


Fig. 2.

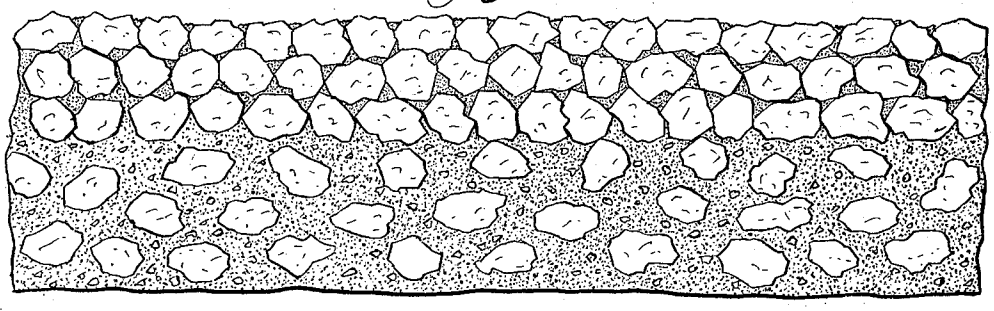
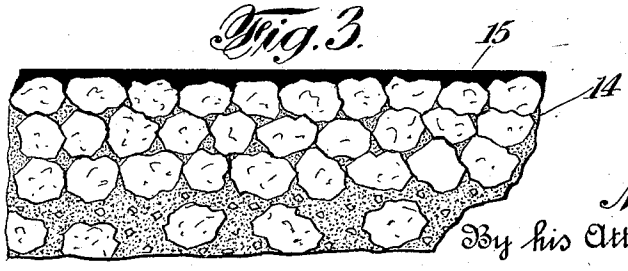


Fig. 3.



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UNITED STATES PATENT OFFICE

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TOP SURFACE OF CONCRETE AND THE LIKE AND METHOD OF FORMING THE SAME

Application filed August 24, 1928. Serial No. 301,882.

This invention relates to top surfaces of concrete and the like, and to methods of forming such surfaces, for example roadways, floor slabs, plaza areas, sidewalks, and other traffic carrying surfaces.

The objects of this invention include the provision of durable, inexpensive surfaces or pavements of the above indicated character, which will be pleasing in appearance and from which various dangerous or undesirable characteristics of the usual forms of pavements are eliminated.

Further and more specific objects, features and advantages will clearly appear from the detailed description given below, taken in connection with the accompanying drawings which form a part of this specification and illustrate by way of example certain embodiments of the invention.

The invention consists in the novel methods and steps of processes set forth by way of example in the following specification, together with the resulting product or products and the novel features thereof.

In the drawings, Fig. 1 is a cross-sectional view illustrating one embodiment of my invention as applied to pavement or sidewalk construction; and

Figs. 2 and 3 are views similar to Fig. 1, but showing alternative embodiments of my invention.

According to the embodiment illustrated in Fig. 1, the main body of concrete as at 10, of a pavement or other construction may be poured in any suitable well-known manner, but, before the surface at 11 is allowed to harden, a suitable material for inhibiting or delaying the setting action is brushed or sprayed upon the surface. Suitable "medication" substances adapted to this purpose are described in my copending application Ser. No. 99,330, filed August 2, 1926, entitled "Process of and materials for treating concrete", of which this application is in the nature of a continuation. Such materials are also more fully set forth in my Patent No. 1,637,321, entitled "Method of and composition for treating concrete", issued July 26, 1927, of which said copending application is in part a continuation.

According to processes disclosed in said patent and said application, the concrete surface is treated with a suitable "medication" to delay or prevent the setting of the cement at the surface layers, so that after the main body of the concrete is hardened, such surface layers of cement may be brushed or washed away, leaving the stone or other aggregate particles exposed to the desired degree. The "medication" substance may be applied as explained in my said patent, so as to affect the concrete only to a predetermined depth, depending upon the extent to which it is desired, to reveal the aggregate for various conditions of use.

As explained in said patent, in the case of wall surfaces the material embodying the "medication" may be conveniently applied to the forms into which the concrete is poured and the concrete in flowing against the forms, will come into proper contact with the treating material to insure uniform treatment. However, in the case of top surfaces, in order to insure uniform treatment of all parts of the surface, I find it preferable to first pour the concrete and after the same is suitably puddled and either before or after the initial setting action takes place, the "medication" substance is sprayed or uniformly brushed over the concrete surface. When the "medication" is carried in a suitable colloidal or drying vehicle, a soft film thereof will be formed on the concrete and after the main body of the concrete has become hardened, the remaining ingredients of this film may be readily removed as by the use of wire brushes and by washing. This will leave a top surface as indicated at 11, which will be relatively rough and irregular due to the protruding aggregate particles, from the upper portions of which the cement has been removed.

The pavement or other traffic way formed as above described is now ready for use unless it is desired to resort to further expedients, as will be hereinafter described, for producing a surface of very exceptional durability and of special colors, textures or patterns. Such a top surfacing is indicated at 12 in Fig. 1 and is preferably formed of concrete with an unusual quantity of stone in the mix, which

will insure a large percentage of stone at the wearing surface. A suitable concrete mixture for this purpose may comprise one part of cement, two parts of sand, together with as much crushed rock of the desired sizes as the mix will comfortably carry, and enough water to give a mushy consistency. For example, five to six parts of stone may be used in such a mixture. A layer of this mixture may be uniformly deposited over the surface of the main body of the pavement 10 and the surface 13 of this layer may also be treated in the above described manner to remove the surface layers of cement and to reveal the aggregate. The roughened surface 11 with the numerous protruding aggregate particles provides a very efficient bonding surface, so that when the layer 12 is applied thereto, an actual monolithic construction is obtained.

Either of the surfaces 11 or 13 prepared in the above described manner will provide an efficient "non-slip" and "non-skid" pavement and offer an exceptional security of traction and freedom from skidding when the construction is used for highways. Such surfaces also provide an efficient friction grip which, especially on grades, will lessen the wear on tires inasmuch as abrasion and wearing of the tires due to slipping is substantially eliminated. On rainy nights, when the usual smooth surface type of pavements reflect a most troublesome and dangerous glaring light in the eyes of vehicle drivers, with surface pavements as above described, there is a uniform diffusion of the beams from the headlights substantially without glare. Strong sunlight is likewise diffused, which makes for comfort and safety of the drivers. Pedestrian travel, both on sidewalks and at road crossings, is also made more safe as a result of the "non-slip" qualities of surfaces treated according to my invention. The invention may be applied also to stairs, steps, tennis courts, or other places where there is danger of slipping especially in wet weather.

With these various uses, the depth to which the aggregate is revealed may be varied and determined by using the "medication" substance in proper quantities and concentrations, which may be best determined by trial according to the data set forth in my above mentioned patent.

In some instances it may be found convenient or desirable to use acids or other reagents for removing the top surface layers of cement.

As is suggested in my above mentioned copending application, in order to have the pavement or other construction harmonize with its natural surroundings, or for other purposes, special selected aggregates may be used either in the main body of the concrete, if its top surface is to be directly exposed, or in the top layer such as at 12. That is, aggregate material of distinctive colors, textures and arrangements may be used and sufficiently exposed to give the desired appearance, but without removing so much of the cement as to endanger the firm and permanent embedment of the aggregate in the concrete under the stress of traffic and under severe weather conditions.

Surfaces of this character have a further advantage in that if a non-absorbent stone aggregate is used, the actual water absorptive area of the concrete may be reduced to about 20% or less of the total top area. The absorption of an undesirable quantity of water, which under severe weather conditions promotes deterioration of the concrete, is therefore prevented and at the same time a durable stone surface of exceptional wearing qualities is presented to the traffic. The removal of the surface layers of cement contributes a further advantage in that skin tensions arising from layers overrich in cement at the surface are eliminated with the consequent elimination of the tendency of such tensions to initiate cracking.

If desired, instead of laying the pavement in two courses as shown in Fig. 1, it may be laid in one course with the usual type of base, and the top coating containing a larger percentage of stone may then be poured on the base before the base is hardened. The surface of this construction may be treated in the same manner as the surfaces above described.

Notwithstanding the foregoing advantages of the revealed aggregate surfaces, an asphalt top coating over a concrete base is preferred under some circumstances. Such a construction is shown in Fig. 3, in which a concrete base 14 is provided substantially according to the constructions shown in either Fig. 1 or Fig. 2. A layer of asphalt as at 15 is then applied to this roughened treated surface. The projecting aggregate will permit the asphalt to be securely locked to the concrete, with the result that the common "waving" of asphalt tops and flowing of the asphalt on grades during hot weather will be substantially eliminated. Such constructions are particularly advantageous on lift and draw bridges. The elevated position of the bridge may be maintained even in hot weather without fear of dislodgment or flowing of the asphalt coating.

While the invention has been described in detail with respect to particular preferred examples thereof which give satisfactory results, it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed as new and desired to be

secured by Letters Patent of the United States is:

1. The method of forming a monolithic body of concrete for bearing traffic, which comprises pouring a body of concrete and superimposing upon the same a layer of concreate embodying a relatively higher percentage of stone aggregate, and treating the upper surface of said layer with a material for delaying the setting of the concrete which when removed will reveal the aggregate.

2. The method of forming a concrete traffic way, which comprises pouring a concrete base and chemically treating the top surface of the same before it becomes hardened to remove the surface layers of cement therefrom and to expose the aggregate, and thereafter applying to said base a surface layer of concrete containing a high percentage of stone and also chemically treating the top surface of said layer to reveal the aggregate.

3. The method of forming a concrete traffic way, which comprises pouring a concrete base and chemically treating the top surface of the same before it becomes hardened to remove the surface layers of cement therefrom and to expose the aggregate to provide a good bonding surface, and thereafter applying to said base a layer of concrete containing an abnormal proportion of selected stone aggregate.

4. The method of forming a concrete traffic way, which comprises pouring a concrete base and chemically treating the top surface of the same before it becomes hardened to remove the surface layers of cement therefrom and to expose the aggregate to provide a good bonding surface, and thereafter applying to said base a layer of concrete containing an abnormal proportion of selected stone aggregate, and also chemically treating the top surface of said layer to expose substantially the entire top surface areas of the upper layer of stone.

5. The method of forming a body of concrete for bearing traffic, which comprises pouring a body of concrete and chemically treating the upper surface thereof to reveal the aggregate to form a good bonding surface comprising the rough projecting aggregate particles, and applying to said surface a layer of asphalt.

In testimony whereof I have signed my name to this specification.

NATHAN C. JOHNSON.