June 2, 1936. H. H. RINEHART 2,042,964

PREFORMED SEMIRIGID UNIT AND METHOD OF MAKING THE SAME

Filed Nov. 2, 1932

Fig. 1.

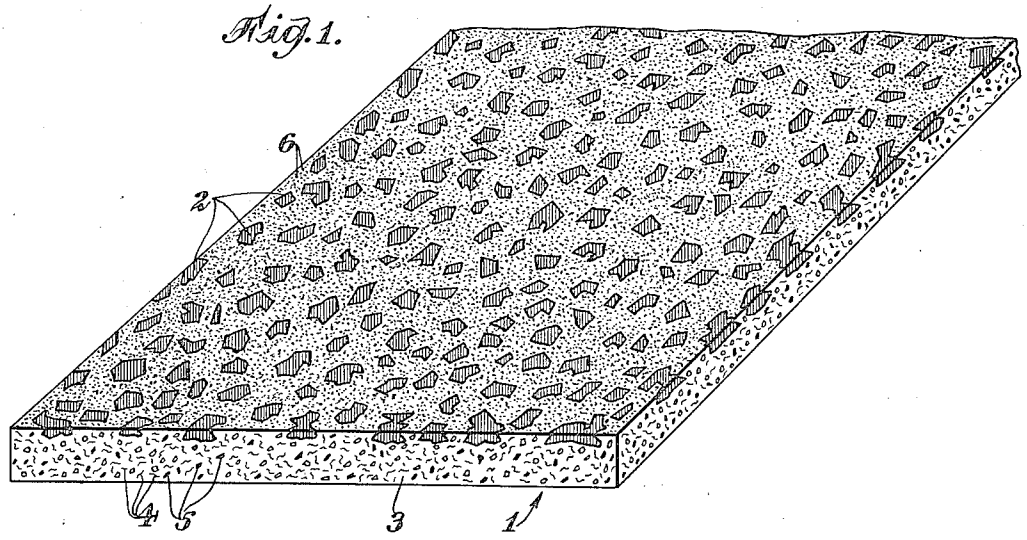
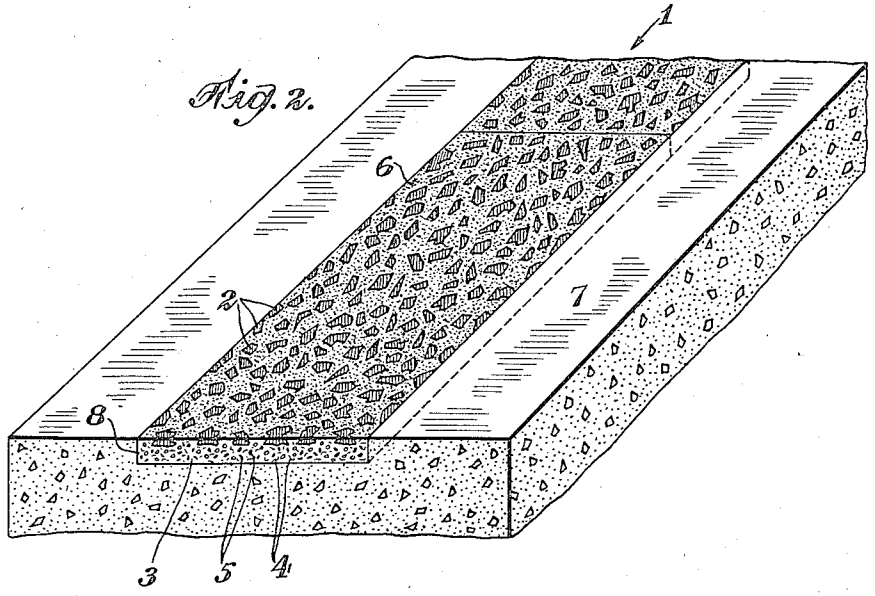


Fig. 2.



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Patented June 2, 1936 2,042,964

UNITED STATES PATENT OFFICE

2,042,964

PREFORMED SEMIRIGID UNIT AND METHOD OF MAKING THE SAME

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Application November 2, 1932, Serial No. 640,748

4 Claims. (Cl. 18—60)

This invention relates to a preformed semirigid unit and to a method of making the same.

The invention comprises the novel features hereinafter described or claimed and, especially a preformed unit adapted for use in flooring or paving and including a mixture of a plastic binder such as asphalt and reenforcing fibers of asbestos, rag or the like and particles of stone or other antiskid or wear-resisting materials embedded in the face thereof. The invention comprises also the method of making, which includes embedding the antiskid material in suitable base material while under compression from all directions. Further, the invention comprises a pavement assembly including a main portion and the preformed units of type described, placed thereon, as a marking strip.

The invention is illustrated in the drawing in which:

Fig. 1 shows a perspective view of the preferred embodiment of the preformed unit; and

Fig. 2 shows a perspective view of a pavement comprising a plurality of the preformed units as a traffic marker.

There is illustrated a preformed unit or slab 1 comprising antiskid and wear-resisting material 2 embedded and locked in a face portion of the slab. The slab is semirigid and contains a thermoplastic binder 3, such as asphalt or stearin pitch that at elevated temperatures are readily fluent. Associated with the binder and intimately mixed therewith or dispersed therein are reenforcing fibers 4, which are suitably asbestos or rag fibers. There may be present also a substantial proportion of granular inorganic filler material 5, including ground limestone, cinders, say, of size to pass completely through a screen having 2 meshes per linear inch, and/or other suitable fillers including comminuted diatomaceous earth in small proportion, say, to the extent of approximately 1 to 3% of the weight of the asphalt, the term "granular" being used herein to include divided material of particle sizes including the range from comminuted diatomaceous earth to cinders of the size described.

The particles 2 of antiskid material consist, advantageously, of stone particles of size, say, to pass a 1-mesh screen. Crushed trap rock has been used to advantage. Also, crushed white quartz has been used, for the purpose of increasing the visibility in the unit, particularly to establish a color that will contrast with other portions of the unit or of a pavement in which the preformed units may be laid, as indicators or traffic markers. Also there may be used highly reflecting particles, such as mica, for the purpose stated and for greater conspicuousness. Also, a small amount of sand 6 may be sprinkled on the surface, for decreasing tackiness of the surface and minimizing the adherence of the units when stacked one on another.

The structure shown in Fig. 2 is a pavement with a main portion 7, of concrete or other conventional composition, provided with a recess 8, in which are set, end to end, preformed units 1, in such manner that these units, after being pressed firmly into position, become relatively immovable with respect to the main portion of the pavement and have upper surfaces lying in approximately the same plane as the upper surface of the main portion of the pavement.

The method of making the preformed units is illustrated by the following specific example of a method of practicing the invention with the use, as antiskid material, of stones of irregular surface.

There is first made a preformed slab comprising a thermoplastic binder, reenforcing fibers, and, suitably also, inorganic filler. Thus, there may be mixed together approximately 15 parts by weight of rag felt cut into small pieces, 25 parts of finely ground limestone or other inert filler of similar density and fineness, 25 parts of coarse filler, such as cinders or their equivalent for the purpose, of size that can be passed through a 2-mesh screen, and 35 parts of asphalt. This mixture is made in a suitable mixer at an elevated temperature, say, about 200° F., in order to render the asphalt binder somewhat fluid. When the mixture has been made intimate, there may be added a small proportion of a material to cause the mixture, when subsequently stirred, to form itself more or less into irregular, round masses or balls. Thus, there may be added approximately 1 part of comminuted diatomaceous earth and additional mixing performed, to incorporate the diatomaceous earth and form balls of the plastic composition. The mixture, either with or without the diatomaceous earth admixture, may be extruded warm through a die and into a cooling tank of cold water. The thus shaped and cooled article may be passed between smoothing plates or rollers, to compress and densify it and to establish approximately the exact shape and size desired. A small amount of sand may be sprinkled over the outer surfaces, for the purpose stated above.

The resulting slab is semirigid (substantially non-flowable) at atmospheric temperatures, and

is adapted to retain its form, in distinction from the tendency of a sheet of asphalt alone or of asphalt containing a limited proportion of pulverized filler to flow slowly, even under slight pressure, at ordinary temperatures.

The next step is the embedding of the antiskid and wear-resisting material. There is first established throughout the semirigid slab a temperature adapted to render the asphalt binder in the slab readily fluent; there has been used to advantage a temperature that is at least as high as approximately 160° F. Also, there is provided a supply of particles of antiskid material, and the said material also is warmed, suitably to a temperature above the temperature of softening of asphalt, to facilitate the subsequent embedding of the material in the slab containing asphalt binder. Thus, there has been used broken trap rock of irregular surface, at a temperature of approximately 400° F. This hot rock is applied to the upper surface of the warm slab made as described above. The rock is dropped onto the face of the slab in such manner and in such amount that when the rock is subsequently pressed into the slab there will be formed a single layer of discrete particles of rock predominantly in closely spaced, non-contacting relationship to each other, as illustrated in Fig. 1. When the hot rock or particles of stone have been applied as indicated, pressure is placed upon the assembly so that the lumps of rock are forced downwardly into the face portion of the slab and the uppermost portions of the rock are caused to lie approximately in the plane of the face of the unit.

In pressing the particles of stone into the preformed slab, the slab is provided on its upper surface with overlying broken rock, is supported on a rigid plate, and is enclosed, around its edges, in a die, such as a strong steel frame. Pressure is then applied, as by a hydraulic press plate, upon the broken rock on the top face of the slab. Under the influence of the pressure the rock is embedded slowly in the slab, as the press plate is finally brought down upon the face of the slab itself. Meanwhile, the spreading out of the slab is prevented by the enclosing framework of the die, so that the entire unit is finally placed under high pressure, say 90 lbs. per sq. in. for a few minutes of time, to cause the rock to be thoroughly embedded and the resulting unit to be highly compressed, compacted and densified.

During this operation the binder and fiber mixture is first forced aside as the pieces of rock move downward, and then, in the final stages of the pressing, the mixture is pressed tightly into irregularities in the sides of the pieces, inasmuch as the slab, during the impressing of the stone, is subjected to pressure in all directions, including counter pressure from the enclosing sides of the die or mold. This is especially important in locking and keying the rock into the composition. As a result, the positions at which the mixture of binder and fibers is forced into the irregularities in the sides of the antiskid particles extend approximately from the lower portions thereof to the level of portions exposed in the plane of the face of the finished unit.

The rag felt used in the original mixture is disintegrated, to a large extent, to discrete fibers, in the final product. If desired, loose, not fabricated or felted fibers, such as short pieces of yarn, may be substituted for the rag felt initially used.

Once the pressing is completed, the resulting unit is removed from the press and allowed to cool. During this cooling process hardening occurs and there is produced a product that not only will preserve its shape under severe conditions of use, but also will prevent movement of the rock with respect to the surface of the unit, even when subjected to the pulling action of the tire of an automobile subjected to strong braking and deceleration. In other words, the particles of antiskid material are locked substantially permanently in preestablished position and exposed on the surface of the unit.

In using preformed strips of the type described as traffic markers, the units are placed, suitably, in a recess in a pavement and are then pressed into position, with a suitable adhesive, as, for example, a mopping with hot asphalt or an asphalt emulsion applied between the units and the pavement. During this pressing and subsequent use of the pavement, the units are gradually expanded to conform to irregularities in the side walls of the recess of the pavement. This expansion may be produced rapidly by placing the units, while warm and semiplastic, in the recess and then applying pressure, as by repeatedly passing a steam roller over the recess with the preformed units seated therein.

In the final pavement assembly provided with the traffic markers, the upper surface of the preformed units and of the main portion of the pavement may lie in approximately the same plane. For best visibility it is desirable that the upper surface of the traffic marker should show contrasts of color within itself or should have a color that contrasts with that of the main portion of the pavement. Thus, a black traffic marker comprising asphalt binder, fibers and inorganic filler, and made as described above, contrasts with a concrete pavement. When particles of stone such as white quartz or mica are used as the material forced into the upper portion of the slab, there is formed a unit which contrasts with either an asphalt or a concrete pavement.

When the preformed units provided with the embedded stone are used as industrial flooring or bridge planking, for example, usual methols of installation may be used. Thus, there may be provided a supporting substructure over which the units are laid and nailed. The fact that the layer of stone is single adapts the unit to be penetrated readily in areas between the discrete particles of stone. Thus, pointed fastening elements may be driven through such areas without injury to the unit; a nail, for example, which is driven through the surface of the unit, well within a space between the discrete particles of stone, will probably not strike stone at a lower depth within the unit.

The particles of stone in the face portion may be so spaced and sized and of such color as to establish desired decorative values. The surface of the face consists in parts of the material of the original slab and, in other parts, of the particles embedded therein.

The terms "pavements" and "paving", as used in the claims, are intended to include flooring, such as flooring of a factory, bridge planking, and the like.

The details that have been given are for the purpose of illustration and not restriction, and many variations therefrom may be made without departing from the spirit and scope of the invention.

What I claim is:

1. In making a preformed unit comprising a non-resilient binder adapted to be made readily

fluent, reenforcing fibers dispersed therein, and particles of antiskid material embedded in and exposed on a face of the unit, the method which comprises forming a shaped mixture of the binder and fibers, rendering the binder therein readily fluent, impressing particles of antiskid material, predominantly in non-contacting closely spaced relationship to each other, into a surface of the shaped mixture containing the binder in readily fluent condition, subjecting the mixture and impressed particles to pressure from all directions, while maintaining the spaced relationship between the said particles, and then hardening the resulting product.

2. In making a preformed unit comprising a thermoplastic binder, reenforcing fibers dispersed therein, and particles of antiskid material embedded in and exposed on a face of the unit, the method which comprises forming a shaped mixture of the binder and fibers, rendering the binder therein plastic, heating the antiskid particles, impressing the heated particles, predominantly in non-contacting closely spaced relationship to each other, into a surface of the shaped mixture containing the binder in plastic condition, subjecting the mixture and impressed particles to pressure from all directions, while maintaining the spaced relationship between the particles, and then hardening the resulting product.

3. A preformed semirigid slab, adapted for use in pavement and the like, comprising an intimate mixture of a non-resilient binder of the type of asphalt and reenforcing fibers distributed therethroughout and antiskid particles embedded in the mixture and exposed on a face of the slab, the said particles having irregularities in the sides thereof and the said mixture having been forced into the irregularities at positions extending approximately from the lower portions of the particles to the level of the exposed portions thereof, whereby the particles are firmly secured in position, the said mixture being substantially non-flowable at atmospheric temperatures, and the said slab being substantially identical with the product made as described in claim 1.

4. A preformed semirigid slab, adapted for use in pavement and the like, comprising an intimate mixture of a non-resilient binder of the type of asphalt, granular inorganic filler material, and reenforcing fibers and antiskid particles embedded in the mixture and exposed on a face of the slab, the said particles having irregularities in the sides thereof and the said mixture having been forced into the irregularities at positions extending approximately from the lower portions of the particles to the level of the exposed portions thereof, whereby the particles are firmly secured in position, the said mixture being substantially non-flowable at atmospheric temperatures, and the said slab being substantially identical with the product resulting from following the method which comprises forming a shaped mixture including the binder, filler material, and fibers, rendering the binder therein readily fluent, impressing particles of antiskid material, predominantly in non-contacting closely spaced relationship to each other, into a surface of the shaped mixture containing the binder in readily fluent condition, subjecting the mixture and impressed particles to pressure from all directions, while maintaining the spaced relationship between the said particles, and then hardening the resulting product.

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