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R. C. HEATH

PAVING

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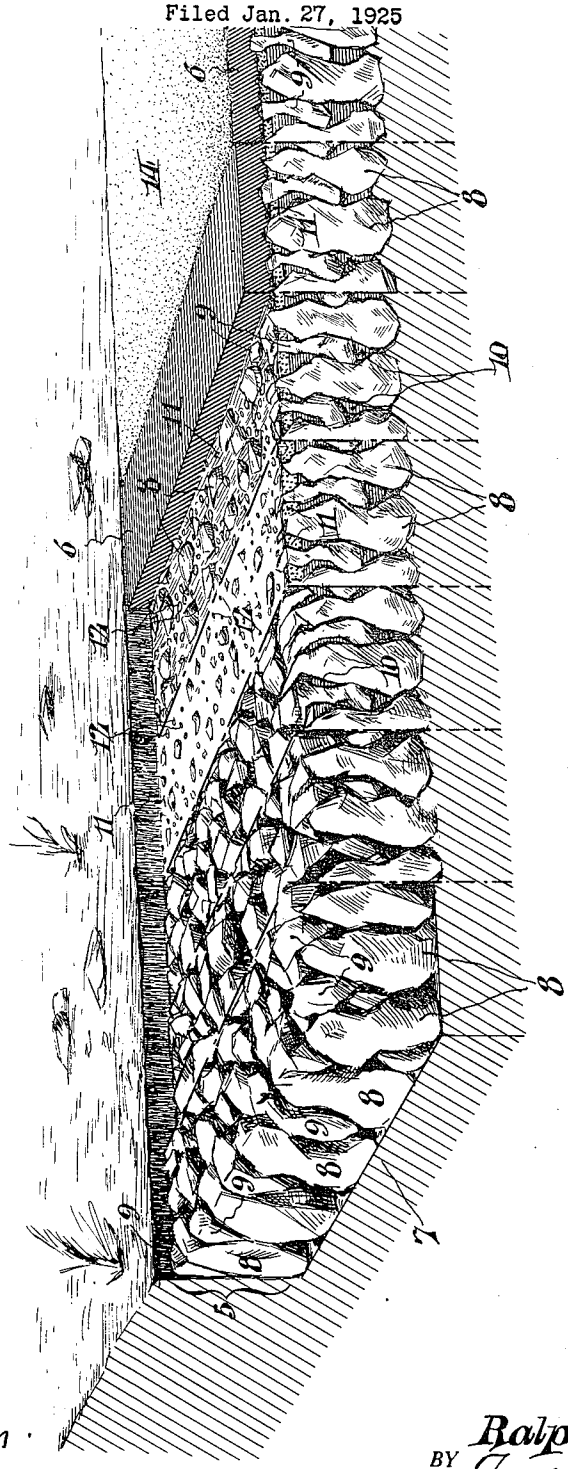

WITNESSES

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UNITED STATES PATENT OFFICE.

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PAVING.

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My invention relates to paving and pavements, and particularly pavements with a bituminous top layer or wearing surface. I aim to construct a serviceable, durable pavement or roadway in a simple, convenient, and economical way. In suitable forms of embodiment, such as that hereinafter described, my invention makes it possible to construct a good bituminous-topped pavement on a concrete base with a minimum of equipment, and out of ordinary materials such as are usually available along or near the right of way,—without stone-crushers or crushed stone for the concrete, or heating and hot-mixing apparatus for the bituminous topping. The materials can be used wet, which minimizes interference and delay from rainy weather.

The drawing affords a fragmentary perspective and sectional view along a roadway being built in accordance with my invention, illustrating various stages of its construction. For clearness, portions of the pavement corresponding to these stages are arbitrarily divided off from one another by dot and dash lines.

In constructing a bituminous-topped pavement according to my invention, the first operation (after preparation of the sub-grade) is the laying of the foundation or base 5, which is preferably wet-cemented or concreted. On this is laid the bituminous upper portion or top 6 of the pavement, bonded to the base 5 with bituminous emulsion such as that known in the road building art as "cold repair cement." Owing to the presence of the water in the emulsion, wetness of the material forming the base 5 does no harm; on the contrary, indeed, it rather tends to facilitate and improve the adherence of the top 6 to the base. When hydraulic cement is used in the base 5, its capacity for taking up water in hardening tends to assist in the drying out of the bituminous emulsion.

Before laying of the base 5 is begun, the sub-grade 7 should be properly shaped, rolled, and compacted, so as to be parallel to the intended surface of the finished pavement and at a proper depth below it. In general, the depth of the completed pavement should be about 9 in.; but it may be considerably deeper where unusually heavy loads are anticipated. The variation in depth should be in the base or foundation 5,—the thickness of the top 6 remaining substantially the same. A top 1½ in. thick represents good general practice.

In order to avoid the necessity for crushed stone, I prefer to build the base or foundation 5 after the old Telford mode of construction, laying suitable stones 8, 9 endwise or edgewise on the sub-grade, well compacted together, and grouting them with cement or mortar,—rather than the mud employed by Telford. Thus I form a solid, non-yielding concrete base with a minimum of hydraulic cement. Starting with field or ledge stones, approximately 8 in. in their longest dimension and not less than 2 in. in their shortest dimension, I lay them on their natural beds, by hand, in direct contact with each other and wedge the larger 8 tight with the smaller 9, so as to get a true, solid surface, with the minimum of voids. The larger stones 8 should be placed directly on the sub-grade, and as many of them as possible should extend through the entire depth of the course. Large flat stones should be laid on edge. The course should then be well rammed or rolled, until all the stones 8, 9 are well bedded and the general surface is as nearly parallel to the intended final grade as is practicable and about 1½ in. below it. Any projecting stones should be napped off to grade. Voids in the surface less than 2 in. in depth or width should not be filled at this stage.

Having been thus rolled and trued up, the stone surface should be thoroughly wet (with a hose) and all dirt or vegetable matter washed from the stones. The grouting may be done immediately after this wetting and washing, while the stones are still wet. I prefer to apply the grout in two pourings, one very thin and wet, so as to flow freely and fill all the lower interstices, and the other somewhat thicker, to fill in the cracks on top of the first. For the first pouring may be used a Portland cement mortar consisting of one part of cement and two parts of clean, sharp sand (by volume), and carrying an excess of water so that it will flow readily. When this mortar 10 has settled into the voids and filled them to within about an inch of the general surface, the second pouring may be made, with mortar 11 comprising cement and sand in about

the same proportions as the first, but with only enough water to give it a creamy consistency. When this is being applied, the surface voids may preferably be filled with small stones 12 not exceeding 1½ in. in their greatest dimension. The surface should then be well rolled, before the grout begins to set. After thorough rolling, the surface should preferably be broomed in such a way that the stones 8, 9, 12 will project about ½ in. above the grout 11 between them.

As soon as the rolling and brooming of this base 5 have been completed, the bituminous top 6 may be spread and compacted directly upon the green, wet concrete. This top may consist of emulsified asphalt (such as cold repair cement) as a binder and a suitably fine aggregate, such as coarse sand with a finer filler. A suitable mixture is as follows:—

Bituminous emulsion	10 to 20%
Stone dust	15 to 25%
Coarse sand	70 to 80%

This top mixture may be prepared on the job, by mixing the materials cold in the same manner as the hydraulic cement grout for the base; indeed, it may even be mixed in the very same concrete mixer. It should be laid upon the green concrete base to such a depth that when compacted by a tandem roller, it will have the desired thickness, about 1½ in., say. A very light coat of asphalt emulsion mixed with about 10% water may then be broomed over the surface and covered with sand or stone chips, as at 14. The water from the bituminous top 6 will dry out by evaporation, etc., leaving the top as a compact, homogeneous coat firmly adherent to the concrete base 5. As already stated, the whole operation is accomplished without the use of heat, either in the preparation of the raw materials, or in spreading and compacting them.

Having thus described my invention, I claim:—

1. The method of constructing a pavement with cemented base and bituminous top which comprises laying a Telford stone base, wet-grouting and then brooming said base, so as to leave the tops of its stones projecting above the grout, and laying the top directly thereon with bituminous emulsion binder.

2. The method of constructing a pavement with cemented base and bituminous top which comprises laying a Telford stone base, grouting said base with thin, fine flowing hydraulic cement grout, to fill its lower interstices, and then substantially filling its cracks with thicker hydraulic cement grout, and laying the top directly thereon with bituminous emulsion binder.

In testimony whereof, I have hereunto signed my name at Melrose, Mass., this 23rd day of January, 1925.

RALPH C. HEATH.