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METHOD OF CONSTRUCTING WEARING SURFACES OF ROADS AND THE LIKE.

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The purpose of this invention is to manufacture in place on the roadway a bituminous wearing surface for various types of foundations. These foundations may include old pavements of concrete, block, brick, asphalt, etc., or such waterbound types as macadam, gravel, top-soil, sand-clay, shell, etc. The novelty of the invention lies in the new and valuable result obtained by the use of a combination of old and new methods of manufacture. In brief, I manufacture, preferably by cold-mix methods, a bituminous wearing surface for roads, streets, etc., which will approximate the strength and durability of bituminous wearing surfaces manufactured by hot-mix methods. Further, my cold-mix wearing surface will be welded and blended with the foundation into a bond far superior to any bond attainable with hot-mix surfaces.

Old foundations may be leveled up to proper cross-section either by filling depressions by approved methods, or by scarifying, reshaping and recompacting. If no curb is present the margin of the area to be surfaced requires extra strength or water-resistance. I remedy this defect by the use of an inverted curb with an extra quantity of asphaltic cement, as explained in my Patents Nos. 1,462,903 and 1,544,440. This stable asphalt may be applied simultaneously with or just in advance of the application of bitumen named above.

Upon the foundation so prepared I apply a bitumen which has been refined and blended to meet the requirements of the foundation in question. Due to the fact that the bitumen will flow more readily over wetted surfaces and its penetration into the upper surface of certain types of aggregates used in the construction thereof, than it will over the same surface when dry, I sprinkle such surfaces with water prior to the application of the bitumen. The further advantage of such sprinkling is explained in my Patent No. 1,462,902. The function of the bitumen so applied is four-fold: First, to penetrate as deeply as possible into porous material in contact with it and replace the unstable water-bond with a stable asphalt-bond; second, to enliven the bitumen in old bituminous foundations; third, to bond the mortar course of the wearing surface firmly to the foundation; fourth, through the diffusion and dissipation of its more volatile and unstable hydrocarbons to produce a mortar which will grow in strength and toughness.

Before covering this bitumen with mineral matter it may be augmented by other applications of the same grade or of a more or less stable grade of bitumen. The grades used may vary from light bitumen to heavy asphaltic cement, either straight or distilled, or dissolved in quick drying naptha.

Upon the bitumen so applied I cast a rock detritus or mineral aggregate. This material may be screenings, mine tailings, clay, sand-clay, top-soil, or other mixtures of inorganic matter containing finely divided matter capable of capillary action. Later applications of bitumen and detritus may be added to remedy deficiencies in earlier applications or to increase the thickness of the wearing surface. The bitumen upon contact with this rock detritus diffuses through such material aided by capillarity, surface tension, pressure, traffic, heat of sun, etc. If left to traffic and climate to cause this diffusion and the ultimate dissipation of more volatile matter, much of the rock detritus is wasted in dust before maturity is attained. This dust in not only a nuisance, but it is a direct loss of useful material, and the long wait for the elements and traffic to accomplish this maturing often runs into many months.

In some instances it may be desired to open the roadway to traffic and exposure to the elements to bring about this diffusion and the ultimate dissipation of the more volatile matter, to bring the bituminous mortar to the desired consistency, this to be subsequently followed with a casting of stone chips, pea gravel or other suitable material, or a subsequent application of bituminous cement, preferably after the above, can be greatly accelerated and the maturing process more quickly brought about by converting material formerly wasted in dust into a valuable wearing surface. This artificial maturing of the mortar is accomplished by kneading and mixing, preferably with my traffic tread roller, as fully described in my Patent No. 1,637,993, dated August 2, 1927. In connection therewith, there may also be used a direct application of artificial heat and pressure, and also by stirring the loose detritus in the presence of artificial heat, or by combination of these means.

By forming and maturing this bituminous

mortar or concrete in the manner stated, where two or more grains of finely divided matter adhere, such as top-soil, clay, dust, or the like are used, the particles are thus separated, and in some instances single grains crushed, increasing the percentage of fines and therefore the stability of the bituminous mortar or wearing surface.

In the event that the character of the available supply of rock detritus is suitable in itself as a total aggregate for the wearing course, I continue the operations for accelerating its maturity until it is sufficiently hard and tough for the purpose desired. If the applied course is deficient in any grade of material, I add the latter thereto and knead the new material into the old until homogenity is attained. This added material may correspond to the filler or mineral dust added to sheet asphalt, or it may correspond to the coarse aggregate in asphaltic concrete. In the latter case, where the mortar can be markedly improved by reinforcement with coarse rock detritus such as stone chips, pea gravel, etc., I apply this material to the surface of the mortar before the diffusion and volatilization is far advanced, so that the mortar will still be sticky, and will readily wet and adhere to such material. I then knead this material into the mortar, increasing the reinforcement until the desired stability is attained, and the foundation is completely protected.

I would sum up the above method as follows: I prepare suitable foundations to receive a wearing course of mortar. I build thereon and bond thereto a mortar of rock detritus and bitumen, manufactured in situ and preferably by the cold-mix process, having such characteristics that it will toughen and become stronger under traffic and climatic influences; I accelerate this maturing process by artificial means; and I further strengthen and reinforce this mortar by kneading into it the required material until, after completion, a wearing surface is produced which will approximate the strength and durability of a hot-mix surface.

In claiming novelty for this method I realize that the following methods are old in the art:

1. To apply a prime coat and then cover with rock detritus.

2. To apply a prime coat, follow with heavier bitumen, and then cover with rock detritus.

3. To depend on both slow and rapid diffusion of volatile hydrocarbons to increase the strength of the layer.

4. To build up a surface treatment by layers through alternate applications of bitumen and mineral matter.

5. To depend on traffic and sun heat to mature the surface.

All of the above may be utilized in my new method, but none of them cover the novel features named because none of them produce a mortar bonded deeply and thoroughly to the foundation and capable of attaining high ultimate strength through slow maturing, and then by artificial means rapidly maturing that mortar while, at the same time, adding largely to its strength through the process of kneading into it finely divided matter to act as filler, as well as coarse aggregate to add reinforcement.

Likewise, it is old to the art to apply a layer or coarse aggregate in bituminous macadam surfacing of stone that ranges from 2½″ to ¾″ in size, and then apply a coating of asphaltic cement and cover with clean stone chips or pea gravel that would range in size from ¼″ to ¾″; also in surface treatments it is old to apply a layer of liquid or semi-liquid or a bituminous cement and cast stone or pea gravel from 1″ to ¼″ in size, and over this coarse aggregate to make a second application of asphaltic cement and cover with fine material such as stone dust, sand and the like; or there may be sufficient bituminous material applied in the first instance and then covered with the size stone or gravel above named sufficient to not require a second coat or bituminous cement, and then cover with the finely divided matter, or material, as above stated.

Any of the practices above named are distinctly different from the instant invention, as it will be noted that I first use the fine material to cover the bituminous cement to build up the bituminous mortar, very dense in consistency, so that when the coarse aggregate, or a casting or kneading of additional fine material is applied, the dense bituminous mortar is worked upward and the additional material downward, producing a bituminous wearing surface of high stability.

Under the method as above described, it is not possible to overload the bituminous cement and weaken its strength by the addition of too much aggregate, as the nature of the materials thus used and from the manner in which they are handled and brought to a state of maturity, will cause them in every instance to refuse a surplus of covering material.

What I claim is:

1. The method of constructing and applying wearing surfaces to road structures which comprises covering the structure with bitumen of suitable consistency, adding to the bitumen coating mineral aggregate, and kneading and thoroughly admixing the bitumen and aggregate to mature the composite surface coating and unite the same with the original road structure.

2. The method of constructing and applying wearing surfaces to road structures which comprises covering the structure with

bitumen of suitable consistency, adding to the bitumen coating mineral aggregate of varying sizes, and kneading and thoroughly admixing the bitumen and aggregate to mature the composite surface coating and unite the same with the original road structure.

3. The method of constructing and applying wearing surfaces to road structures which comprises covering the structure with bitumen of suitable consistency, adding to the bitumen coating fine mineral aggregate, kneading and thoroughly admixing the bitumen and aggregate in situ, adding coarser aggregate, and continuing the kneading and admixing until the coating is substantially homogeneous.

4. The method of constructing and applying wearing surfaces to road structures which comprises wetting the surface of the road structure, covering the wetted surface with bitumen of suitable consistency, adding to the bitumen coating mineral aggregate, and kneading and thoroughly admixing the bitumen and aggregate to mature the composite surface coating and unite the same with the original road structure.

In testimony whereof I affix my signature.

SAM EVERETT FINLEY.