

BUILDING AND MAINTAINING ROADS WITH REFINED TAR.*

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OF the various binders used for road purposes in the last decade only the bitumens have been successful. There are two classes of bitumens so used, and they may be divided into asphalts and tars. The former are found native or may be produced by the distillation of asphaltic oils. Tars are obtained from a number of sources, but those made during the destructive distillation of bituminous coal have given the best service and most satisfaction.

Refined tars for surface treatment of roads have been used during the past fifteen years. With the advent of the automobile came the dust nuisance, and it was in great measure to alleviate this that experiments with refined tars were begun in Europe by Dr. Guglielminetti at the beginning of the twentieth century. These experiments were very successful and led to the tremendous development of the road tar industries of to-day.

Tars are refined for roads and pavements so as to obtain materials suitable for cold application surface treatment, blanket-coat (hot application), the construction of tar-bound macadam and paving pitch filler.

Bituminous roads may be constructed either by the penetration or the mixed methods. By the penetration method is meant spreading and rolling crushed stone to the proper depth, crown and grade, after which hot, refined tar is sprayed over the surface of the broken stone, then the voids are filled with chips and a second or seal coat of refined tar is applied. By the mixed method is meant mixing the heated aggregate and binder together before placing in the road. Both methods give satisfactory results when the construction is properly done, and it is a matter of judgment on the part of the engineer which he selects. Mixed work costs about 25 per cent. more than penetration and requires greater skill and care.

The construction of a tar macadam built by the penetration method will first be taken up. This will be followed by a description of mixed work, and a discussion of maintenance by using a cold surface treatment, which can also be used on water-bound macadam, will conclude the paper.

It is assumed that the drainage problem has been solved and adequately taken care of before the construction of the pavement is begun. The purpose of a pavement of any kind is to distribute the load over the foundation, as well as to provide a waterproof wearing course. The foundation is the earth on which the pavement rests, and it should be thoroughly compacted by rolling; all soft spots should be made firm and unyielding, and the surface of the foundation after rolling should be parallel to that of the finished road.

Base Course.—On such a well-compacted foundation broken stone is spread to a depth of from four to eight inches, depending on the kind of stone and the character of traffic the road is to carry. This is large-sized stone, such as will pass a 3½-inch ring and be retained on a 2¼-inch ring. The harder the stone, the smaller the size that may be used. This base course should be thoroughly rolled so that no movement takes place when the roller passes. A 10 or 12-ton roller is best.

In order to make the base course more stable; to keep the foundation from working up; and to prevent the refined tar, that is applied later on to the next course above, from leaking through, and thus being wasted, the spaces between the stones should be filled with fine, clean gravel, coarse sand or stone screenings. Rolling should be continued, always beginning at the side and working up to the centre. The rolled surface of the base course should resemble a water-bound macadam free from dust.

On this base course either a penetration or a mixed top may be placed.

Penetration Method.—The wearing course is made up of stone, 2¼ to 1¼ inches, and after rolling it should be 2½ inches in depth. The stone is carefully spread, and rolled so that the surface is smooth and firm. This course is to be filled with tar, so that great care must be taken when soft stone is used to avoid crushing, and thus sealing the surface with rock dust, which would prevent the penetration of the bitumen.

Refined tar will not stick to dirty or wet surfaces. Therefore, the wearing-course stone must be clean and dry.

Refined Tar for Binder.—Not less than 1¼ imperial gallons nor more than 1½ imperial gallons of refined tar at a temperature of from 200° F. to 275° F. are then spread uniformly over each square yard of the wearing course. The tar is best applied by pressure distributors, but hand-pouring pots may be used if it is impossible to secure suitable apparatus.

It is very important that the tar be uniformly applied so that the resulting pavement has neither lean nor fat spots in it.

Filling and Sealing.—The spaces between the stones of the wearing course are now filled with ¾-inch clean stone. This should merely fill the voids and not form another course.

Roll again, sweep off any excess stone, and the road is ready to receive the seal coat, which consists of ⅓ to ½ imperial gallon of tar at 200° to 275° F. temperature and is covered with sand or peastone.

Roll for the last time, and the road is then ready for traffic.

Mixed Method.—On the base course, constructed as previously described, can be placed a wearing course made by the mixed method, or such a wearing course may be placed on a concrete base or on a Telford base.

It is necessary to have a mechanical power mixer to properly mix stone and bitumen. There are many such mixers on the market. Some of them heat up the drum with an open flame. The flame should never be allowed in the mixer after the bitumen has been introduced. Portable plants can be had as well as stationary plants, and it is important to choose one that has a capacity suitable to the job.

The advantages claimed for refined coal tar over other bitumens are that it is easily used in the cold-mix type, in which the stone is not heated; that it requires less heat, since the tars have a lower melting point than asphalts, and that the same number of men can turn out a greater yardage per day.

The greatest care must be exercised to see that the temperature is right and that no batch is burned. A burned batch means a bad spot in the pavement that is bound to show up in time.

About 2½ inches of wearing course material is placed on the base course and rolled until it is compacted

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