from the stone the thin film of dust which would prevent the proper adherence of the dust-layer to the macadam. I would think that was rather a dangerout procedure unless the road was given sufficient time to dry subsequent to the application of the oil.

Under such conditions, then, what is going to happen to this dust that lies on the road? It is going to be spread over the road, again, so it seems to me rather a superfluous procedure.

Any necessary repairs to the old macadam should be made in order to improve the conformation of the road, and provide for a free drainage to the gutter.

On country stone roads, where frequently the dust lies inches deep in layers, a horse sweeper could be used with great benefit and at very little added expense to remove this surface material to the side of the road, where it could be taken care of by different means, depending upon the environment. I have in mind many country roads where, regardless of the character of the surface of the road and the amount of dust and loose material on the road, the oil cart goes along and sprinkles the sand. It is only a short



Devonport Street, Hamilton, macadam treated with asphalt road oil in early Spring, 1917. Photo in Fall after season's traffic

time before that oil dust is blowing with every vehicle that passes, making the actual dust conditions much more disagreeable than the ordinary dry state of the dust.

Oiling performed after cleaning is much more effective, and I am of the opinion that the results warrant the small additional expense of such cleaning.

Having prepared the road surface, the next consideration is the character of the material which is to be used and the method of its application.

Asphaltic petroleums and tar products are the most common materials used for this purpose. Until recently they have been easily obtainable. They lend themselves readily to distribution, and prior to war prices were an economic material for this purpose.

The asphalt petroleum is sold commercially as a 40 per cent., 60 per cent. and 80 per cent. asphaltic oil, increasing in specific gravity in the order named. The tar products are sold under trade names which indicate varying degrees of specific gravity, the purchaser purchasing that particular product which is most suitable for his requirements.

Our experience in Hamilton has proved that what is known as a "light road oil" or a "medium road oil" for city work may be used with great effectiveness. In some cities a considerable lighter oil is used than the "light road oil," but this requires a more frequent application with a consequent increased cost.

Ordinarily, except under very heavy traffic, one application per season has been found to be sufficient of the 40 per cent. and 60 per cent. asphaltic petroleum. The lighter grades of oil may, however, be applied earlier in the season and without the necessity of heating in order to facilitate distribution. They are easily absorbed, dry out more quickly and reduce the dust nuisance during the late spring and early summer months. Light oils are applied also in smaller quantities than the heavier oils, as low as .085 gallons per square yard being found sufficient for good results. This is a very low figure. It is the Toronto figure. It is necessary to go over these roads two or three times a year, but they do away with that sticky condition which obtains in the use of heavier oils.

Oils are applied to road surface by several methods, depending upon the character of the road and the amount of oiling to be performed. In small communities it is sometimes distributed from the barrel by use of the ordinary hand sprinkling can. In such cases lighter oils are used and heating is obviated. In a larger way it is applied by gravity from tanks, either through a perforated pipe or nozzles specially adapted for the purpose, the oil being applied either hot or cold, depending upon its specific gravity.

Large motor-pressure distributors are now frequently used where the amount of work warrants it. This method of distribution being usually known as the penetration method. The material is applied hot, a heating device being used in conjunction with the distributor.

I have not the exact mileage of macadam in the city, but we have felt that we would not be justified in the purchase of a large distributing pressure sprinkler, for the reason that with our eight horse-drawn sprinklers, one in each district, we are able to cover so much more ground and are able to get our work done early in the season, earlier than if we were operating only one machine. We find, when we start oiling, that the people are very anxious to get their streets oiled, and it is a problem to know which street to oil first. We have had to make a rule that the streets with the greatest amount of traffic will be the streets that will first receive attention, regardless of how many friends a particular man has on any street, or how anxious they are to get their street oiled before their neighbors' street.

Much better results are obtained if the road surface is warm when the oil is applied, as diffusion through and over the surface then readily takes place before the oil congeals. This is especially applicable to the heavier bituminous materials. The surface should be free from moisture.

I was going to put it stronger and say it "must" be free from moisture. We have, however, been caught out in a rainstorm with a cart full of oil, and continued work. If the sun came out and dried things up quickly, it was not so bad. But we have had difficulty where the oiling was performed on damp surfaces, in getting proper drying and penetrating effect.

Heat is usually necessary in the application of the heavier road oils. In Hamilton, where last year and this year we are using a medium asphalt road oil, *i.e.*, an asphaltic oil which under certain conditions of test contains an average of 60 per cent. of the original asphaltic petroleum, the oil is first heated in large steel tanks by steam coils to a temperature of from 100 to 150 degrees, and pumped into ordinary oil carts, from which the oil is distributed by gravity on to the street.