

LETTER TO THE EDITOR.

Stone-Filled Sheet Asphalt.

Sir,—We read with interest an article on "Stone-filled Sheet Asphalt," by Charles A. Mullen, in your number of 15th instant.

Mr. Mullen makes some very broad claims as to the advantages of stone-filled asphalt, and naturally we take note of them. The advantages claimed are: (1) that it is less slippery; (2) that it marks up less in the summer; (3) it is easier of traction in the summer; (4) it is less liable to displacement; (5) it costs less.

First, as to slipperiness. That can be scarcely more than a matter of opinion. In an earlier part of the article we find the statement made that "this initial roughness passes away after one or two summers' traffic, and leaves a surface almost as smooth as that of the usual sheet asphalt." The lack of slip depends on friction combined with a relationship between the two surfaces concerned; that is, the tendency of one to seize the other. It is frequently controlled by the interposition of a third element. In roads, the third element may be water, ice or snow. Horses slip badly on granite blocks if the load behind is greater than the weight of the horse. The slight marking of a good asphalt pavement is really a desirable feature for horse-drawn vehicles, as the small amount of penetration enables the horse to use his strength with some help from the surface. Stone filling with 30 per cent. of 1/4-inch chips seems unlikely to make much difference in slip on dry, bare and cold pavements. When ice and snow are present, differences of composition are not operative factors.

With reference to marking up, we have seen ordinary sheet asphalt pavements that marked up very little, and others that marked up a good deal. This condition, we always believed, was controlled by the filler and the penetration of the bitumen. In this climate we would hesitate to lay, in residential districts, a pavement that did not mark up quite noticeably in the summer.

The claim of ease of traction is, of course, dependent on the first two considerations.

The liability to displacement is important, and we certainly have seen some bad cases due to faulty binder course. We feel inclined to go so far as to say that a pavement laid badly with binder course is inferior in this respect to a stone-filled asphalt laid by the same personnel.

And now we come to the big point: it costs less. Mr. Mullen gives some very convincing figures, showing that two inches of surface mixture costs more per square yard than two inches of stone-filled sheet asphalt. What about the binder course? If, instead of two inches of surface mixture, we had one inch of close binder and one inch of surface mixture (which is quite sufficient) we could make the following comparison:—

	Ordinary sheet asphalt.		Stone-filled sheet asphalt.	
	Lbs.	Cost.	Lbs.	Cost.
Asphalt cement at \$.01 per lb.	17	\$.17	20	\$.20
Filler at \$.0025	20	\$.050	20	\$.050
Graded sand at \$.0005	68	\$.034	100	\$.050
Clean stone chips at \$.0008 ..	none		60	\$.048
Crushed stone, 20-mesh to 3/4 in., at \$.0005	95	\$.047	none	
	200	\$.301	200	\$.348

According to Richardson, the binder course was probably introduced to protect the friable, natural cement from the necessary traffic incidental to laying the wearing surface, but it is apparent that the introduction of the binder course was quite a considerable economy. The open binder, taking less bitumen, is even less expensive, and would do well for light traffic in residential districts. A large amount of sheet asphalt with open binder course has been used in pavements under heavy traffic.

On the whole, we cannot see that Mr. Mullen has proved for stone-filled sheet asphalt that "its actual cost is so low that it is the most economical pavement for light residential streets and boulevards. It should, therefore, be adopted by most cities as the standard form of pavement. . . ." Why should it be adopted only "by most cities," we might inquire, by the way?

Mr. Mullen may be right in his claims of superiority, but we are "from Missouri." He makes broad statements, but he adduces no proof. The only figures given can be used to show that a two-course pavement will cost less for materials than the stone-filled one-course pavement.

T. LINSEY CROSSLEY, A.M.Can.Soc.C.E.
Montreal, February 20, 1917.

LETTER TO THE EDITOR.

Brushwood as a Medium for Sewage Filters.

Sir,—From the final paragraph of the article in *The Canadian Engineer* of February 8th, 1917, on "Brushwood as a Filter Medium for Sewage Filters," by Mr. George Phelps, it would appear as though the brushwood filter was only "the outcome of previous experiments with a lath filter," and had not been suggested by me.

In order to remove any misapprehension on the point, I would like to state that prior to the North Toronto installation the process had already been patented by myself; that the installation of a brush filter was already in hand at the Morley Avenue experimental sewage disposal plant, and that the conversion of one of the North Toronto stone trickling filters into a brushwood filter was made at my request by the commissioner of works, Toronto, to be operated as an experimental filter to obtain scientific information.

GEO. G. NASMITH,
Director of Laboratories.
Toronto, March 3rd, 1917.

Some very rich deposits of tungsten occur, it is said, in Portugal in the form of wolframite, accompanied by scheelite, and also, frequently, by cassiterite (binoxide of tin). The three principal deposits are the property of independent companies, the first, a French concern, exporting its whole output to France; the second an English company, exporting to England; and the third which is operated exclusively by Portuguese capital. The daily output of the first two averages about one ton of wolframite each, containing 60 per cent. of tungsten trioxide; the output of the other concern is somewhat less. In addition, there are numerous smaller deposits, but the output of these is not known. In 1914 the exports of tungsten ore from Portugal amounted to 1,700 tons. No figures, however, are available as to the quantity produced. At present the exportation is made under the intervention of France and Great Britain, which countries absorb the greater part of the total shipments. A small quantity is exported to the United States.