F. Ordinary pile bridges built with certain kinds of treated timber.
G. Fire resisting paints.
H. Pile bridges having I-beam stringers.

The fireproof feature of ballasted floor timber trestles is not the most important reason for adopting this type of construction, and the details of such bridges can not properly be considered here, except to say that the ballast serves as a first-class fire protection for the timber. These bridges with treated timber cost about 75 per cent. more than the ordinary pile bridges.

The method of entirely covering the ties with metal is favored by many roads. It affords very good protection when the sheets are firmly attached and in good condition. If the metal used is of poor quality and light weight, holes will soon develop and if it is not properly fastened it will soon work loose and the ends will curl up. If these things happen the covering is apt to assist ignition rather than prevent it, because the loose ends and holes will catch coals and sparks. There are many different ways of putting on this covering, the principal difference being the method of attaching the galvanized iron around the track rails. In most cases, No. 22 iron is used. To obtain the best results the metal should be securely fastened and of such a quality and weight that it will last a reasonable length of time. It should last as long as the timber in the bridge. When a good quality of No. 22 galvanized iron is used, this type costs about 75 cts. per lin. ft. of single track bridge.

Ballast covering over the entire deck is another type which affords good protection so long as everything is in good condition and no timber is exposed. Gravel ballast is used in most cases, although stone, slag and clay are also used to a considerable extent. The vibration will cause the ballast to bunch over the more rigid parts of the bridge, leaving some of the ties exposed. A very serious objection is that the ballast holds the moisture which causes decay in the timber. Clay affords a good protection and can be obtained in almost any locality; it is more stable under vibration than gravel, but it will hold moisture longer than the other materials. The draft of high speed trains tends to remove the ballast covering from the bridge.

The position of the filler blocks between the ties should be considered. The two extremes are—placing the filler on the stringers and, placing it flush with top of ties. Placing the filler directly on the stringers necessitates a large amount of ballast for covering without gaining anything over a smaller amount as regards fireproofing. The decay of the timber is faster, because the contact surface between ballast and timber is larger, and the larger volume of ballast will hold more moisture. If the filler is placed flush with the top of the ties, the gravel rests on an unbroken surface and will readily move about, due to the vibration of the bridge and the draft of trains, which will leave bare spots. Probably the best way is to place the filler so that it will come about 1 in. below the top of the tie and then place 3 ins. of ballast on the filler, which would provide 2 ins. of ballast above the ties. With gravel ballast such construction costs about 35 cts. per lin. ft. of single track bridge. Sometimes galvanized iron is placed over the guard rail in connection with the ballast covering. This adds about 15 cts. per lin. ft. to the cost.

Galvanized iron is placed on the tops of caps and stringers by a number of roads, the object being to protect the timber from weather as well as from fire. In this way the ties are left bare but the more important parts of the bridge are protected. It is not difficult to keep such covering in place. The metal should be of quality and weight sufficient to last as long as the timber. Using a good quality of No. 20 galvanized iron the cost is about 60 cts. per lin. ft. of single track bridge.

Sometimes a covering of ballast about 2 ins. thick is placed on the metal covering of type B. This partly overcomes some of the objections of this type, in that if some of the edges of the galvanized sheets work loose or holes develop in the metal the presence of the ballast will prevent fire. The draft caused by trains and the vibration of the bridge will cause the ballast to move about and leave bare spots as in type C. Also the ballast will retain moisture; but this is not so serious as in type C, because the ballast does not come in contact with the timber; however, the moisture will rust the metal. The use of gravel ballast will increase the cost of type B about 6 cts. per lin. ft.

On one road, zinc treated timber was found to be of value in resisting fire. The trestles are built in the usual way and treated timber used. This type probably adds $1.50 per lin. ft. to the cost of a pile bridge and it would not pay to use it for the one reason of fireproofing because the cheaper types would afford just as good protection.

Fire resisting paints are used to a considerable extent in the East and in Canada, with good results in most cases. The Board of Railway Commissioners of Canada requires that if Clapp's paint is used, one coat must be applied at least every five years. It costs about 27 cts. per lin. ft. for labor and material to paint a single track bridge with this paint.

The use of I-beams for stringers reduces the probability of fire, although this can hardly be called a method of fireproofing timber trestles. Such construction costs about 20 per cent. more than ordinary pile bridges.

Inquiries were made of 86 railroads regarding the methods of fireproofing timber trestles. From these 79 replies were received, 29 of which stated that no fireproofing of any kind was used. The remaining 44 replies are summarized as follows, showing the number of railroads using the different types:

Types used.	
A	6
B	2
C	3
D	5
G	4
A and D	6
A and H	1
A and C	6
A, B and D	2
A, B and C	1
A, G and F	1
A, C and D	1
B and C	1
B, C and E	1
B and D	1
C and D	2
D and G	1

Most railroads favor the ballasted floor pile bridge because of its many desirable qualities in addition to fireproofing. In type D, a metal covering on caps and stringers, the protection from weather is an advantage about equal to fireproofing. In types F and H, treated timber and use of I-beam stringers, permanency is a strong argument for their use, aside from the fireproofing qualities.

The types used solely for fire protection are: B, metal covering on ties; C, a 2 to 4-in. ballast covering; E, metal covering and a small amount of ballast; G, fire-resisting paints.

With a ballast or metal covering inspection of bridges is quite difficult and repairs are also more difficult and expensive to make. Type G is the simplest and most satisfactory form, is comparatively moderate in cost, and does not change the general construction of the bridge in any way.