WATERPROOFING DESIGN FOR RAILROAD BRIDGE FLOORS.

THE Proceedings of the American Society of Civil Engineers for December, 1914, contains a paper by Mr. S. T. Wagner, presenting a specification for the design, materials and manner of application of the waterproofing of railroad bridges with solid steel floors. There is a widely varying practice in this respect among engineers in bridge construction, and doubtless Mr. Wagner's paper will bring forth much discussion of value in determining on more uniform practice. The specifications presented are the outgrowth of many years' experience with various materials and designs, and the writer states and correlates the more or less fixed principles which he believes to exist. Waterproofing plays an important part in the details which the designer must bear in mind when engaged on a structure of this type. It is undertaken for two reasons: (1) To protect the metal of the floor from corrosion due to the alternately wet and dry condition of a ballasted floor; and (2) to prevent the water, which is absorbed by the ballast and given off slowly, from dripping on a street beneath.

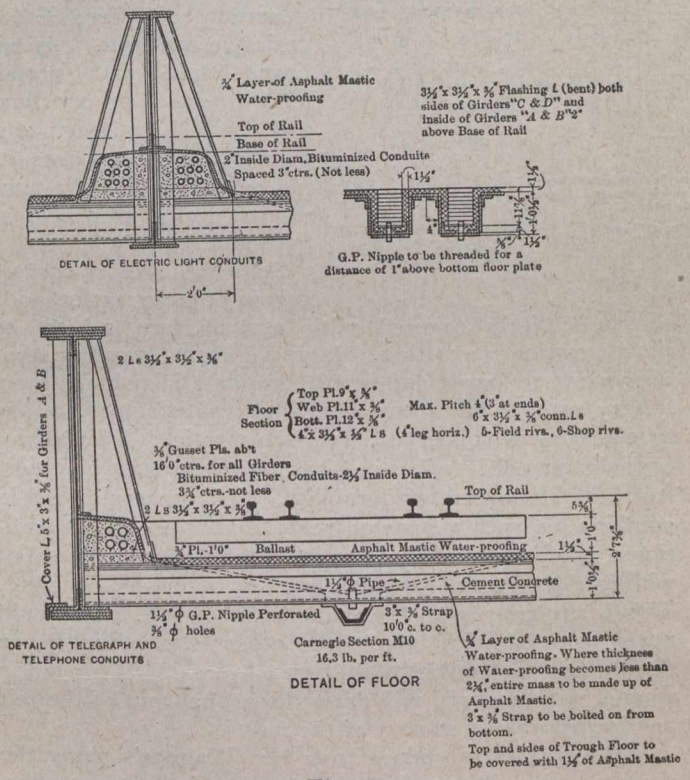

Fig. 1.

even though the drainage back of the abutment is specially good. It is much better to collect the water on the deck of the bridge, take it below the floor by inlets and downspouts, and discharge it below the floor on the ground, or into a sewer (if in a city). Such inlets can be made so as to be accessible from below for cleaning, and, with ordinary care, can be made satisfactory as far as leakage around them is concerned. To carry the water away quickly, there should be a number of these inlets on any bridge of considerable extent.

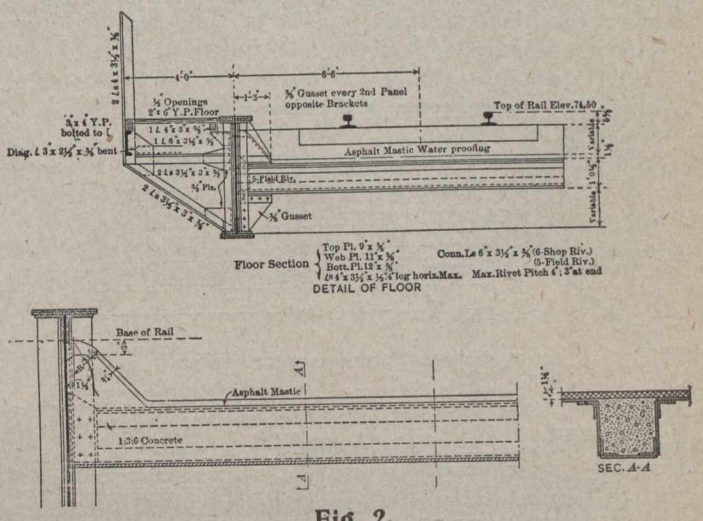

Fig. 2.

In the case of deck structures, the waterproofing details are simple, the principal questions to be settled being the type of waterproofing to be used and the durability of the materials. The application of the waterproofing—whatever kind may be selected—is not difficult.

In a half-through structure the conditions for waterproofing are at their worst. If the top of rail is near the top of girder, it is generally advisable to carry the waterproofing over the girder and encase its entire top in concrete.

The finish of the waterproofing against the web of a half-through girder, the top of which is 3 ft. or more above the top of rail, is one of the most difficult problems to be solved. In some cases, it is the practice to carry the waterproofing nearly if not all the way up to the top of the girder, and protect it with a considerable thickness of concrete, but, generally, it is finished up against the web not far above the level of the top of rail. This finish, if done satisfactorily, will make a good piece of work of the structure as a whole, provided the detail in respect to

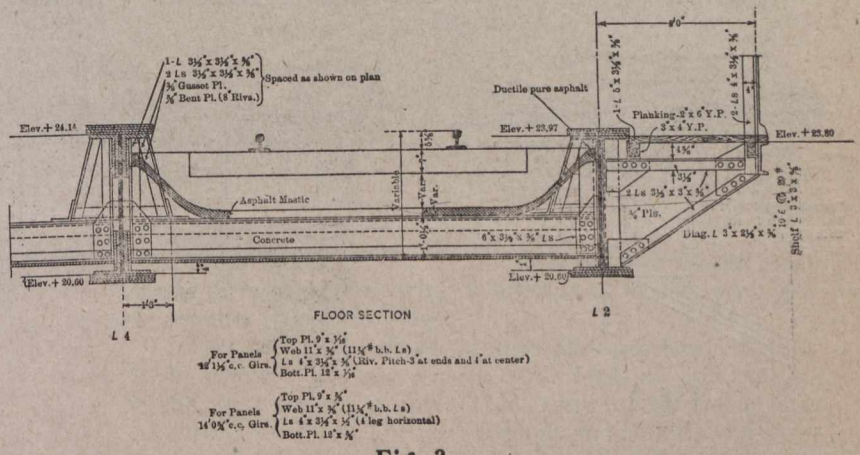

Fig. 3.

The primary object is to provide such details as will remove water from the bridge in the quickest possible time and by the shortest route. Another is to design the height of the waterproofing so that it will be above the highest water level, in case of the possibility of water being held on the bridge for any considerable time after a storm. It is also considered inadvisable to throw all the water off the bridge at its ends, over the back walls. It is very difficult to design at this point a satisfactory detail which will prevent water from forcing its way back over the back wall and down the face of the abutment,