To all whom it may concern:

Be it known that I, ALBERT H. RHETT, a citizen of the United States, residing at the city of New York, in the county of Brooklyn in the State of New York, have invented certain new and useful Improvements in Waterproof Concrete Floors for Bridges, of which the following is a full, clear, and exact description.

This invention relates to bridges and viaducts comprising a supporting framework and a concrete flooring. It is desirable in such structures, when they are built over streets or passageways, to render them water-proof, so that rain-water which may fall upon the bridge or viaduct will not drip down to the street or passage below. Furthermore, it is desirable in these structures to prevent water from entering the abutting surfaces between the frame structures and the body or bodies of concrete which they sustain.

The type of bridge which I especially have in mind to improve, comprises, usually, sets of longitudinal girders connected together by a flooring consisting of cross supports embedded in or supporting a solid concrete floor. It is a comparatively simple matter to render the top surface of this concrete flooring water-proof, but the vertical joints between the concrete body and the longitudinal girders present considerable difficulty, due to the fact that the movements of the live load upon the bridge and variations in temperature, cause the joint at this location to open and close, so that during a rain storm, water is permitted to pass downward between the abutting surfaces of the girders and the concrete bed and drip to the passageway below, or, sometimes freeze in the joint, causing rupture of the cement bed.

Therefore the object of my invention is to provide a construction which will at all times exclude water from this joint and to that end my invention consists in interposing between the abutting surfaces of the concrete bed and its supporting girders, a filling or course of elastic, coherent and adherent material which is preferably located in the angle between the upper surface of the concrete bed and the vertical surface of the web of the girder, which material, by reason of its adhering quality, will remain attached to both of the abutting surfaces, and by reason of its coherent quality will maintain its own integrity, and by reason of its elasticity will yield to permit of the relative movement of the abutting surfaces while continually furnishing a bar to the entrance of water into the joint.

My invention also consists of the combination of the improved means for obtaining a water-tight joint between the floor and its supporting structure with means for waterproofing the entire surface of the bridge floor, whereby I am able to construct a bridge which will be absolutely water-tight under normal conditions.

I have illustrated my invention in connection with a multi-track railway bridge floor of the half-through solid type, but it is not my intention to be limited to this specific form, as the invention is capable of broad application with all types of bridges and viaducts constructed with concrete floors and metallic supporting structures.

In the accompanying drawing the figure is a fragmentary cross-sectional view through a multi-track bridge having a concrete floor showing my improved waterproof joint and membrane for the floor.

The main girders or supporting structure for the bridge are constructed in the usual manner and consist of webs 1 to which are fastened the top and bottom plates 2 of the girders by angle plates 3, the girders being provided with stiffener angles 4 of the usual construction. Arranged transversely to the main girders and supported thereby, are cross-beams 5, one of which is shown in dotted lines. The concrete floor or deck 6 is supported by these transverse girders 5 which are embedded therein, the floor forming with the webs 1 of the main girders a joint 7. The top surface of the floor 6 may be graded from the side to the center, forming a central longitudinal depression of sufficient depth and width to receive the track ballast 8 on which the ties 9 and the rails 10 rest. The concrete floor 6 may be reinforced in any desired manner to prevent it from cracking under the strains resulting from the live load or the expansion and contraction of the concrete due to temperature changes.

Preferably at the upper end of the joint 7 a recess or trench 11 is formed in the concrete floor 6, which recess is preferably cut in the concrete before it has firmly set. This recess or trench is filled with an elastic, adhesive, cohesive non-hardening compound 12 which adheres to both the metallic surface...
of the web of the girder and the surface of the concrete body to form with each of these an absolutely water-tight joint. Compounds having rubber or gutta percha as a base have given the best results, but any compound which complies with the above stated requirements may be used.

When the concrete floor is subjected to the recurrent weight of passing trains or to changes of temperature, the recess 11 and joint 7 will more or less open and close but in all such movements the filler 12 will adhere to both the web and the walls of the recess, its elasticity permitting it to expand and contract thereby preventing any water from entering the space between the abutting faces of the concrete girder and finding its way down to the street below. The sealing compound is preferably made non-hardening so that it may be used on bridges subjected to different climatic conditions without losing its elasticity.

The top surface of the floor 6 is covered with a thin layer 13 of the same compound as the filler 12 which is joined thereto and forms therewith a water-proof covering extending over the entire top surface of the concrete floor, from web to web, which will effectually prevent any water from leaking through. Preferably the layer 13 and the filler 12 are covered with burlap or some other fabric, over which is placed a concrete layer 14 which shields the same from contact with the track ballast 8.

While I have shown the recesses or trenches only between the webs of the main girders and the concrete floor yet it is to be understood that these recesses are cut adjacent the stiffener angles, brackets, and, in fact, all supporting structures which form joints with the concrete floor and in which the intervening space between it and the concrete is subject to variation due to the deformation of the concrete floor.

While it is preferable to form the recess 11 for the filler 12 at the same time that the bridge is constructed, yet it is evident that my invention is capable of use with bridges already built, in which the concrete has pulled away from the supporting structure to form a gap or crevice, which gap with or without additional shaping may be filled with a compound such as I have described.

Having described my invention, I claim:

1. In a bridge construction, a concrete floor, a horizontal metal girder to which said floor is joined and forming a support therefor, said floor being in contact only with substantially the lower half of the web of said girder and said floor and girder being separated at the top of their vertical line of jointure by an intervening space, an adhesive, elastic waterproof filler in said space forming a water-tight joint with the girder and floor respectively, a layer of the same compound over the top surface of the floor and joined to said filler to form a water-proof covering for said bridge and protective covering of concrete over said layer.

2. A half through girder bridge comprising main longitudinal, vertically disposed, webbed, metal girders, cross beams supported thereby, a concrete floor supported by said beams and in contact only with substantially the lower halve of said webs, a water excluding body of elastic, coherent and adherent material interposed in the joint between the abutting surfaces of said web and floor and spread over said floor in a continuous layer, and a protective layer of concrete covering said last named layer and adapted to receive the track and ballast.

3. In a bridge construction, a concrete floor, a horizontal girder to which said floor is joined and forming a support therefor, said floor being in contact only with substantially the lower half of the web of said girder and said floor and girder being separated at the top of the vertical line of jointure by an intervening space, and an adhesive, elastic water-proof filler in said space forming a water-tight joint with the girder and floor. respectively, and a layer of water-proofing material over the top surface of the floor and joined to the filler to form therewith a water-proof covering over the entire floor of the bridge and a protective covering of concrete over said layer.

4. A half through girder bridge comprising main longitudinal, vertically disposed, webbed, metal girders, cross beams supported thereby, a concrete floor supported by said beams and in contact only with substantially the lower halve of said webs, a water excluding body of elastic, coherent and adherent material interposed in the joint between the abutting surfaces of said web and floor, a layer of water-proofing material over said floor and connecting said material, interposed in the joint formed therewith, a continuous water-proof layer over said floor and a protective layer of concrete covering over said last named layer and adapted to receive the track and ballast.

In witness whereof, I subscribe my signature, in the presence of two witnesses.

ALBERT H. RHETT.

Witnesses:

WALDO M. CHAPIN,
JULE ZELENENKO.