Sept. 17, 1929. R. FARNHAM ET AL 1,728,265

FLOOR CONSTRUCTION AND METHOD OF PRODUCING THE SAME

Filed June 16, 1926

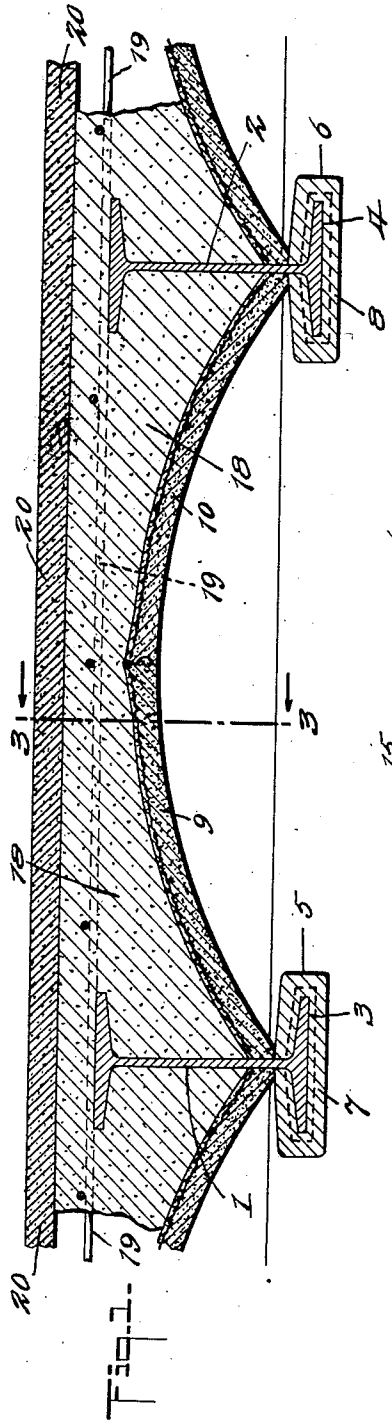


Fig. 1.

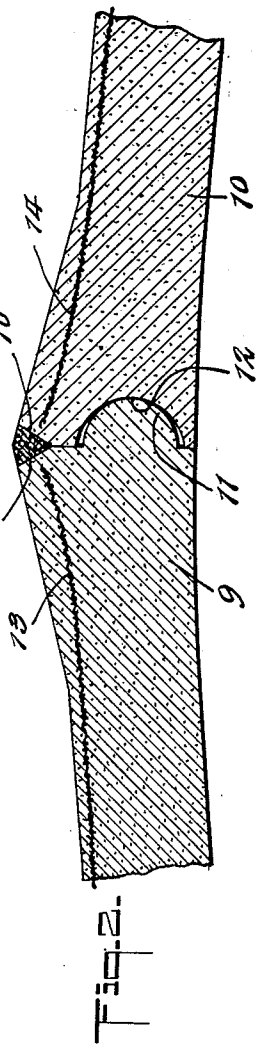


Fig. 2.

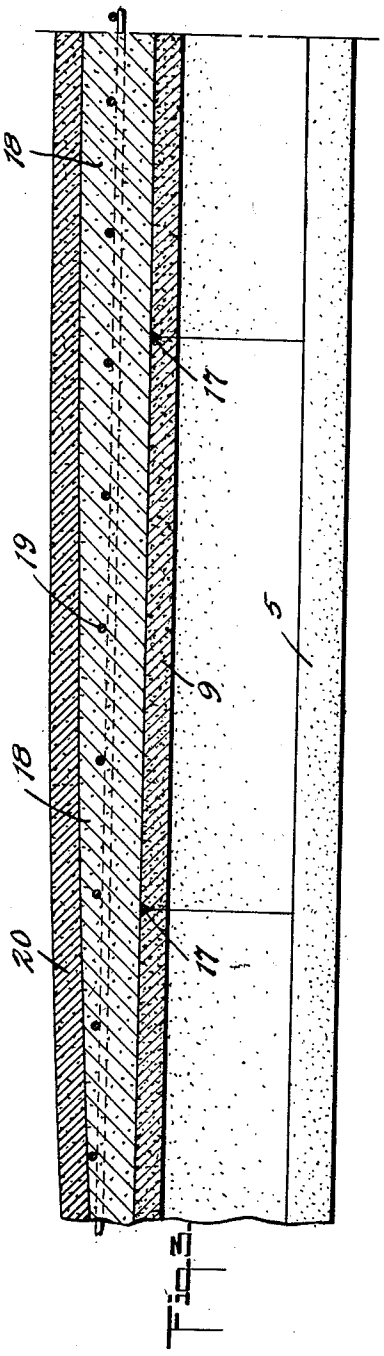


Fig. 3.

INVENTORS
ROBERT FARNHAM
BRYON C. COLLIER
BY Marks & Clerk
ATTORNEYS

Patented Sept. 17, 1929 1,728,265

UNITED STATES PATENT OFFICE

ROBERT FARNHAM, OF PHILADELPHIA, AND BRYAN C. COLLIER, OF ALLENTOWN, PENNSYLVANIA, ASSIGNORS TO CEMENT GUN CONTRACTING COMPANY

FLOOR CONSTRUCTION AND METHOD OF PRODUCING THE SAME

Application filed June 16, 1926. Serial No. 116,266.

This invention relates to floor construction and methods of producing the same and more particularly to floor construction in which use is made of slabs, which are formed by shooting cementitious material against suitable forms, to form arches between floor members such as flanged girders or beams, the floor proper being formed by adding poured concrete and applying a suitable surface. Members thus formed by shooting cementitious material into place may be referred to as formed of shot cementitious material or shot-cement.

An object of the invention is to provide for economical and rapid construction of cement or concrete work of a permanent character. A further object of the invention is to provide a floor structure of arched form in which the lower parts of the arches are formed of slabs of pre-shot cementitious material and additional shot cementitious material covering the bases of the supporting structural members such as flanged girders or beams.

Other objects of the invention are to provide an improved method of constructing floors of concrete or cement and structural members such as flanged steel beams or girders; a floor structure in which the space between two flanged structural members is bridged by two curved slabs, the outer edges of which are supported on the flanges at the bases of said structural members and the inner edges press against each other at a higher point so that an arch effect is obtained; and a floor structure in which the space between flanged structural members is bridged by an arch including two curved pre-shot cement slabs supported at their outer edges on the lower flanges of the structural members and having interfitting inner edges so as to provide a substantial joint irrespective of the height of the arch formed by the two slabs.

Other objects and advantages will appear upon consideration of the following detailed description and of the drawings in which:

Figure 1 is a longitudinal sectional view of a floor structure embodying the invention;

Figure 2 is a detail view on a larger scale illustrating the joint at the inner edges of the slabs shown in Figure 1; and

Figure 3 is a sectional view taken along the line 3—3 of Figure 1.

The structure illustrated in Figure 1 comprises transverse I-beams 1 and 2 forming part of a bridge floor indicated in general by 3. The lower flanges 3 and 4 of the I-beams 1 and 2 respectively, are covered, preferably by shot cement casings 5 and 6 respectively reinforced by suitable reinforcing material 7 for the casings 5 and 8 for casing 6. Supported by the casings 5 and 6 respectively are curved pre-shot cement slabs 9 and 10 resting at their outer edges against the upright web of the I-beams 1 and 2 and engaging each other at their inner edges.

The slabs 9 and 10 are pre-shot or preformed by shooting concrete or cement against the surfaces of concave curved forms, one edge of each slab 9 being formed with a convex longitudinal rib 11 and the corresponding edge of each slab 10 being formed with a concave longitudinal groove 12. Each slab 9 is provided with reinforcing material 13 preferably near the convex face of the slab and each slab 10 is formed with reinforcing material 14 similarly placed, and for reason to be brought out hereinafter each of the slabs 9 is tapered at 15 above the rib 11 and each slab 10 is tapered at 16 above the groove 12, making the depth of the engaging surfaces at the ends of the slabs of substantially the same depths as the bodies of the slabs throughout the greater part thereof. Before placing the slabs 9 and 10 in the position shown in Figure 1, the corners between the casing 5 and the web of the I-beam 1 and between the casing 6 and the web of the I-beam 2 are wet with grout, preferably of neat cement. Then the edges of the slabs 9 and 10 of which the outer edges have been made of the proper shape to fit into said corners, are placed in position and their other edges brought into engagement with the ribs 11 entering the grooves 12. As the result of such rib and groove formation the slabs 9

and 10 are permitted to adjust themselves and form a suitable arch structure. After the slabs 9 and 10 have adjusted themselves into position, the groove between the beveled surfaces 15 and 16 is sealed with shot cement to prevent the passage of moisture through the joint.

As shown in Figure 3 the side edges of the slabs 9 and 10 are beveled at the upper faces of the slabs so that when the arches are formed there will be grooves 17 which may also be sealed with shot cement.

After the arches have been thus formed by means of the slabs 9 and 10, concrete 18 may be poured on the slabs and between the I-beams such as 1 and 2, and the concrete 18 may be carried above the upper faces of the I-beams to the desired level for the road bed, provision being made of suitable reinforcing material 19. The concrete 18 may be covered by a road surface of any suitable material such as asphalt 20.

Preferably the forms for the curved or arched slabs are to be made at the site of operations, cured for two weeks and kept wet for four days, and in making the slabs, the upper or convex sides are to be next to the forms. It is also found desirable to slush the top surfaces of the slabs with neat cement grout before the concrete 18 is poured. As shown in Figure 2, the slabs are thickened and strengthened at the edges which meet at the tops of the arches. It will be apparent that by tapering the engaged edges of the slabs 9 and 10 respectively at 15 and 16, breakage of the upper edges of the slabs will be avoided while at the same time a suitable sealing groove will be provided as hereinbefore pointed out. It should be noted that the reinforcing material 13 and 14 in slabs 9 and 10, respectively, terminates adjacent to and just above the lower edges of the tapered or bevelled portions 15 and 16, thus exerting a strengthening effect at the upper edges of the engaging surfaces of the ends of the slabs.

As a result of forming the slabs 9 and 10 by shooting the material into concave forms, the concave sides or faces thereof are made up of material of much greater density than that of the convex sides or faces and are adapted to resist the destructive effects of, for example, the blasts of gases in the exhaust of locomotive, whereas the convex sides of these slabs are of much less density, and tend to be rougher, thereby facilitating the formation of a good bond between the slabs and the poured concrete. As hereinbefore stated, the reinforcing material 13 is preferably near the convex faces of the slabs or adjacent to the concave surfaces of the forms, and, inasmuch as the material must be blown through the reinforcement to reach the surfaces of the forms, the tendency of the material at the convex faces of the slabs to be less dense and of greater roughness, is increased.

It should be understood that the structure and process disclosed are merely illustrative and that various changes can be made without departing from the true spirit and scope of the invention.

Having thus described our invention, we claim:

1. Floor structure comprising parallel structural members having upright webs and flanges at their lower edges, and downwardly-concave slabs of pre-shot cementitious material resting at their outer edges against said webs and on said flanges and having their inner edges engaging so as to produce a toggle or arch effect, the inner edge of one of said slabs being formed with a channel of arcuate cross section and the inner edge of the other slab being formed with a rib of arcuate cross section adapted to enter said channel, and both of said slabs being thickened at their inner edges to provide sufficient bearing engagement and being beveled at their upper faces and at their inner edges so as to obviate danger of breakage at the upper edges of the engaging faces.

2. A floor structure comprising parallel structural steel members having vertical webs and flanged lower edges covered with reinforced cementitious material shot into place, and curved slabs of pre-shot cementitious material supported at their outer edges in the angles between the webs and the coverings of said flanges and being shaped to fit in said angles, said slabs being formed at their engaging inner edges with a groove and rib respectively, adapted to provide rolling contact therebetween.

3. A method of forming floor structures, which comprises arranging in parallel relation structural steel members having flanges at their lower edges, placing reinforcing material around said flanges and shooting cementitious material into place to form coverings for said flanges, shooting cementitious material against curved forms to produce curved slabs with edges of different slabs adapted to interfit, placing slabs in pairs with their outer edges resting on the coverings of said flanges and with such interfitting edges in engagement, slushing the upper surfaces of the slabs with neat cement grout, and pouring concrete upon said slabs and between said structural steel members.

4. A method of forming floor structures, which comprises arranging in parallel relation structural steel members having flanges at their lower edges, placing reinforcing material around said flanges and shooting cementitious material into place to form coverings for said flanges, shooting ce-

mentitious material against a concave curved form to produce curved slabs with edges of different slabs adapted to interfit, placing slabs in pairs with edges resting on the coverings of said flanges and with such interfitting edges in engagement, shooting cementitious material into the joint at said interfitting edges, slushing the upper or convex surfaces with neat cement grout, and pouring concrete upon said slabs and between said structural steel members.

5. A floor structure comprising parallel structural members having upright webs and flanges at their lower edges, and downwardly-concave arched slabs of pre-shot cementitious material resting at their outer edges against said webs and on said flanges and having their inner edges engaging so as to produce a toggle or arch effect, said slabs being reinforced at their inner edges by forming each of them with a bulge at the upper side and with a bevel leading down to the upper edge of the engaging end surface which has substantially the same depth as the slab.

6. A floor structure comprising parallel structural steel members having vertical webs and flanged lower edges covered with reinforced shot cementitious material, and curved slabs of pre-shot cementitious material supported at their outer edges in the angles between the webs and the coverings of said flanges and being shaped to fit in said angles, said slabs having engaging surfaces of substantially the same depth as the bodies of the slabs and being provided on their outer surfaces with an enlargement to provide additional support at the upper edges of said engaging surfaces, and with metallic reinforcing material extending substantially to said upper edges.

7. A floor structure comprising parallel structural members having vertical webs and flanges projecting therefrom below the upper edges thereof, arches resting at opposite ends in the angles above said flanges and including a single thickness of arched slabs of reinforced pre-shot cementitious material of relatively great density at their concave faces and of less density and greater roughness at their convex surfaces, and reinforced concrete on said arched slabs.

In testimony whereof we hereby affix our signatures.

ROBERT FARNHAM.
BRYAN C. COLLIER.