July 5, 1927. 1,634,549

D. B. LUTEN

EXPANSION JOINT DRAIN

Filed Aug. 21, 1925

Fig. 1.

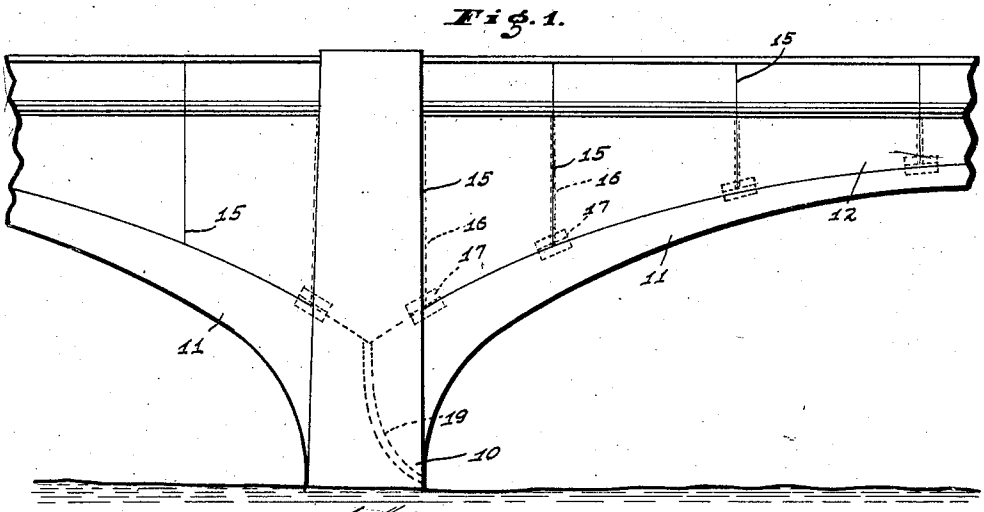


Fig. 2.

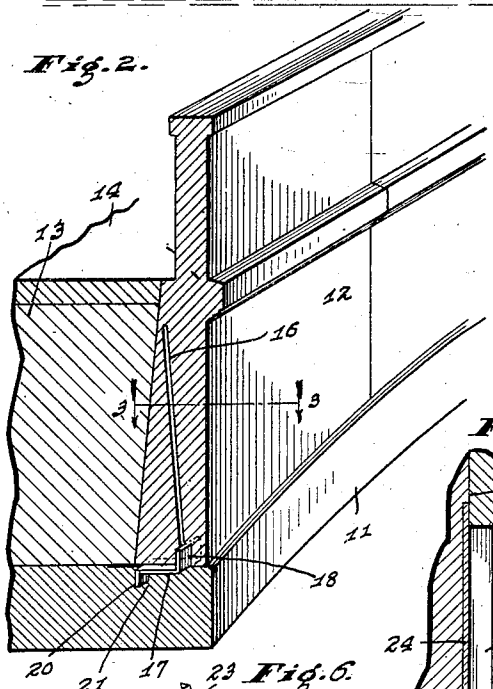


Fig. 3.

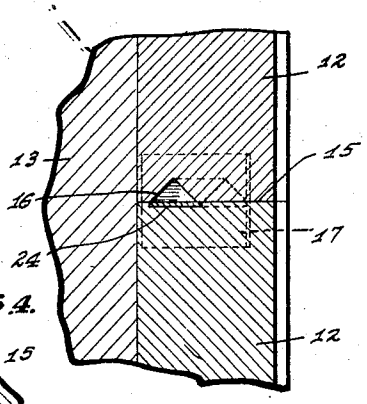


Fig. 4.

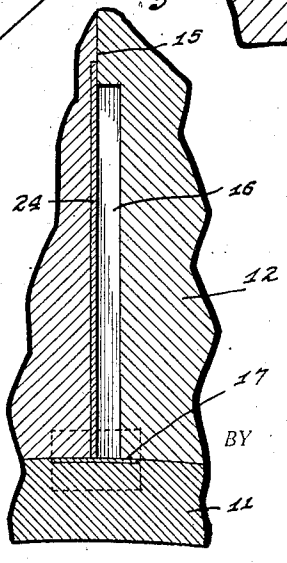


Fig. 5.

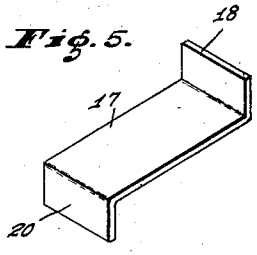
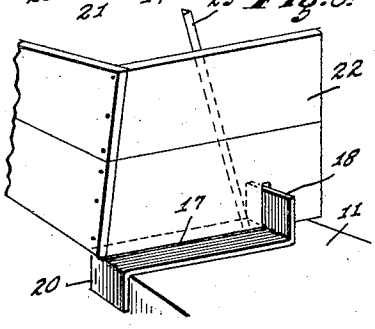


Fig. 6.



INVENTOR.
DANIEL B. LUTEN,
BY
G. B. Fehlberg.
ATTORNEY.

Patented July 5, 1927. 1,634,549

UNITED STATES PATENT OFFICE.

DANIEL B. LUTEN, OF INDIANAPOLIS, INDIANA.

EXPANSION-JOINT DRAIN.

Application filed August 21, 1925. Serial No. 51,548.

It is the object of my invention to prevent water from seeping through an expansion joint in a wall, from the fill behind the wall to the front face thereof; and especially to prevent such seepage through an expansion joint in a spandrel wall of a bridge.

In carrying out my invention, I provide a water-catching groove within the expansion joint, which groove carries to the bottom of the wall any water which enters and tends to seep through the expansion joint; and in addition provide two features which, though desirably used in combination, may also be used separately. These two features are: first, the provision of a flashing at the bottom of the wall, on to which flashing the lower end of the groove in the joint discharges any water caught by it, the front end of this flashing being turned upward in front of such groove to prevent the water from flowing toward the front face of the wall, and the rear end of the flashing desirably being turned downward near the back of the wall, and embedded in the base of the wall or in the arch if the wall is a spandrel wall; and, second, the making of the groove in the joint slightly oblique to the vertical, and so that its downward slope is toward the front face of the wall.

The accompanying drawing illustrates my invention: Fig. 1 is an elevation of a fragment of an arch bridge whose spandrel walls have expansion joints drained in accordance with my invention; Fig. 2 is a sectional perspective view of a fragment of the arch ring and spandrel wall, taken at an expansion joint, to show the construction of the drain; Fig. 3 is a transverse section on the line 3—3 of Fig. 2; Fig. 4 is a section taken along the line of the groove of the expansion joint; Fig. 5 is a perspective view of the flashing; and Fig. 6 is a fragmentary perspective view of the forms used in pouring the wall, with the flashing associated therewith.

While I have shown my invention in connection with expansion joints in the spandrel walls of an arch bridge, that is merely by way of example, for my invention is applicable to walls of any type.

The bridge is shown as having a pier 10 from which spring arch-rings 11, which arch-rings carry spandrel walls 12 behind which may be the usual fill 13 supporting the roadway 14. At any desired points in the walls 12 there may be expansion joints 15. These will be differently located according to the design of the wall or bridge; but my invention is not concerned with the location of the expansion joint or joints.

An expansion joint, such as the joint 15, consists of a plane joint, usually vertical. Water from the fill behind the wall, as from the fill 13, tends to seep through such an expansion joint; and any water which does seep through to the front face usually spreads over the front face near the bottom of the expansion joint and results in staining such front face. However, the seepage in a simple plane joint tends to spread more or less over the whole face of the joint, so that there tends to be some stain on the front face of the wall throughout the height of the joint.

The spread of the seepage over the entire joint has heretofore been lessened to some extent by providing a groove in the joint for carrying downward any water which enters the joint. Prior to my invention, however, such a groove has not been effective even entirely to prevent the spread of the water throughout the height of the joint, for some of the water has passed the groove and continued through the joint to the front of the wall. This has happened when the groove has been vertical, as it sometimes is; and has also happened when the groove is slightly slanting with the upper end farther forward than the lower end, as has more often been the construction. In the latter case, the seepage water flows by gravity to that side of the groove which is toward the front of the wall, and seeps therefrom to the front of the wall through the joint.

According to my invention, I provide a groove 16 in the joint, as has heretofore been done; but I make this groove slightly oblique to the vertical in the direction to make the slope downward and forward toward the face of the wall. This makes the groove effective to carry downward to the bottom of the joint any water which seeps into the higher portions of the joint; for any such seepage water which enters the joint 15 from the fill 13 and reaches the groove 16 remains by gravity on that side of the groove which is toward the rear of the wall, because of the aforesaid slant of such groove. Thus by slanting the groove 16 as stated, with its lower end forward,

the seepage of water through the joint except at the bottom thereof is effectually prevented; for all the water which enters the expansion joint is effectually carried downward by the groove 16 to the bottom of the joint.

To prevent the seepage at the bottom of the joint, whether or not the groove 16 is slanting, I provide a flashing 17 which underlies the joint 16 and at its front end has an upwardly projecting flange 18 in front of the lower end of the groove 16. The water which is carried downward by the groove 16 is discharged on to this flashing 17, and prevented by such flange 18 from going forward to the front face of the wall. Instead, the body of the flashing 17 carries the water back into the bottom of the fill 13. There may be a weep drain 19 through the arch ring or through the face of the wall to carry off any moisture which settles through the fill or is returned by the flashing 17; but this weep drain 19 is not a part of my invention.

The rear end of the flashing 17 is desirably provided with a downturned flange 20, which is embedded as at 21 in the arch-ring 11 or other footing for the wall.

The flashing 17 may be made of a strip of sheet metal, desirably copper, of suitable width and length, which will vary according to the installation. As the arch-ring 11 is completed, the end of the copper strip for the flashing is embedded in the concrete as it is poured. Then the strip of copper is laid down flat toward the outside of the ring, and has its outer end turned upward to form the flange 18. The forms 22 for the concrete may be notched to receive this flange 18, as is shown in Fig. 6; the wall 12 at one side of the expansion joint 15 of course being poured first. A strip 23, usually V-shaped, is fastened to the inner face of these forms 22 in position to form the oblique drain-groove 16; so that such drain-groove will be provided in the joint 15 when the forms are removed. This drain-groove may be covered by a thin board or strip of sheet metal 24, to prevent concrete from entering the groove when the wall at the other side of the expansion joint 15 is poured, and this board or strip may remain in the completed wall.

I claim as my invention:—

1. A wall having an expansion joint, which expansion joint has within it a groove which slopes downward toward the front face of the wall.

2. In a bridge, the combination of an arch-ring, a spandrel wall thereon, and a fill behind said spandrel wall, said spandrel wall being provided with an expansion joint having within it a groove which slopes downward toward the front face of the wall.

3. A wall having an expansion joint, which expansion joint has within it a groove which leads to the bottom of said expansion joint, and a flashing set below said wall at said joint and on to which said groove discharges, said flashing leading from the lower end of the groove toward the back of the wall and being provided with an upturned flange between the groove and the front face of the wall.

4. A wall having an expansion joint, which expansion joint has within it a groove which leads to the bottom of said expansion joint, and a flashing set below said wall at said joint and on to which said groove discharges, said flashing leading from the lower end of the groove toward the back of the wall and being provided with an upturned flange between the groove and the front face of the wall, said groove in the expansion joint being inclined to the vertical so that it slopes downward toward the front of the wall.

5. In a bridge, the combination of an arch-ring, a spandrel wall thereon, and a fill behind said spandrel wall, said spandrel wall being provided with an expansion joint having within it a groove which leads to the bottom of the joint, and a flashing located at the bottom of said expansion joint beneath the wall and on to which said groove discharges, said flashing leading backward into the fill and being provided with an upturned flange in front of the lower end of the groove.

6. In a bridge, the combination of an arch-ring, a spandrel wall thereon, and a fill behind said spandrel wall, said spandrel wall being provided with an expansion joint having within it a groove which leads to the bottom of the joint, and a flashing located at the bottom of said expansion joint beneath the wall and on to which said groove discharges, said flashing leading backward into the fill and being provided with an upturned flange in front of the lower end of the groove, the rear end of said flashing having a downturned flange which is embedded in the arch ring.

7. In a bridge, the combination of an arch-ring, a spandrel wall thereon, and a fill behind said spandrel wall, said spandrel wall being provided with an expansion joint having within it a groove which leads to the bottom of the joint, and a flashing located at the bottom of said expansion joint beneath the wall and on to which said groove discharges, said flashing leading backward into the fill and being provided with an upturned flange in front of the lower end of the groove, said groove being oblique to the vertical so that it slopes downward toward the front face of the spandrel wall.

8. In a bridge, the combination of an arch-ring, a spandrel wall thereon, and a fill behind said spandrel wall, said spandrel wall being provided with an expansion joint hav-

ing within it a groove which leads to the bottom of the joint, and a flashing located at the bottom of said expansion joint beneath the wall and on to which said groove discharges, said flashing leading backward into the fill and being provided with an upturned flange in front of the lower end of the groove, the rear end of said flashing having a downturned flange which is embedded in the arch ring, said groove being oblique to the vertical so that it slopes downward toward the front face of the spandrel wall.

In witness whereof, I have hereunto set my hand at Indianapolis, Indiana, this 18th day of August, A. D. one thousand nine hundred and twenty-five.

DANIEL B. LUTEN.