T. A. SCHAFFER.

WATERPROOFING SHIELD FOR EXPANSION JOINTS.

APPLICATION FILED DEC. 14, 1908.

951,289. Patented Mar. 8, 1910.

2 SHEETS—SHEET 1.

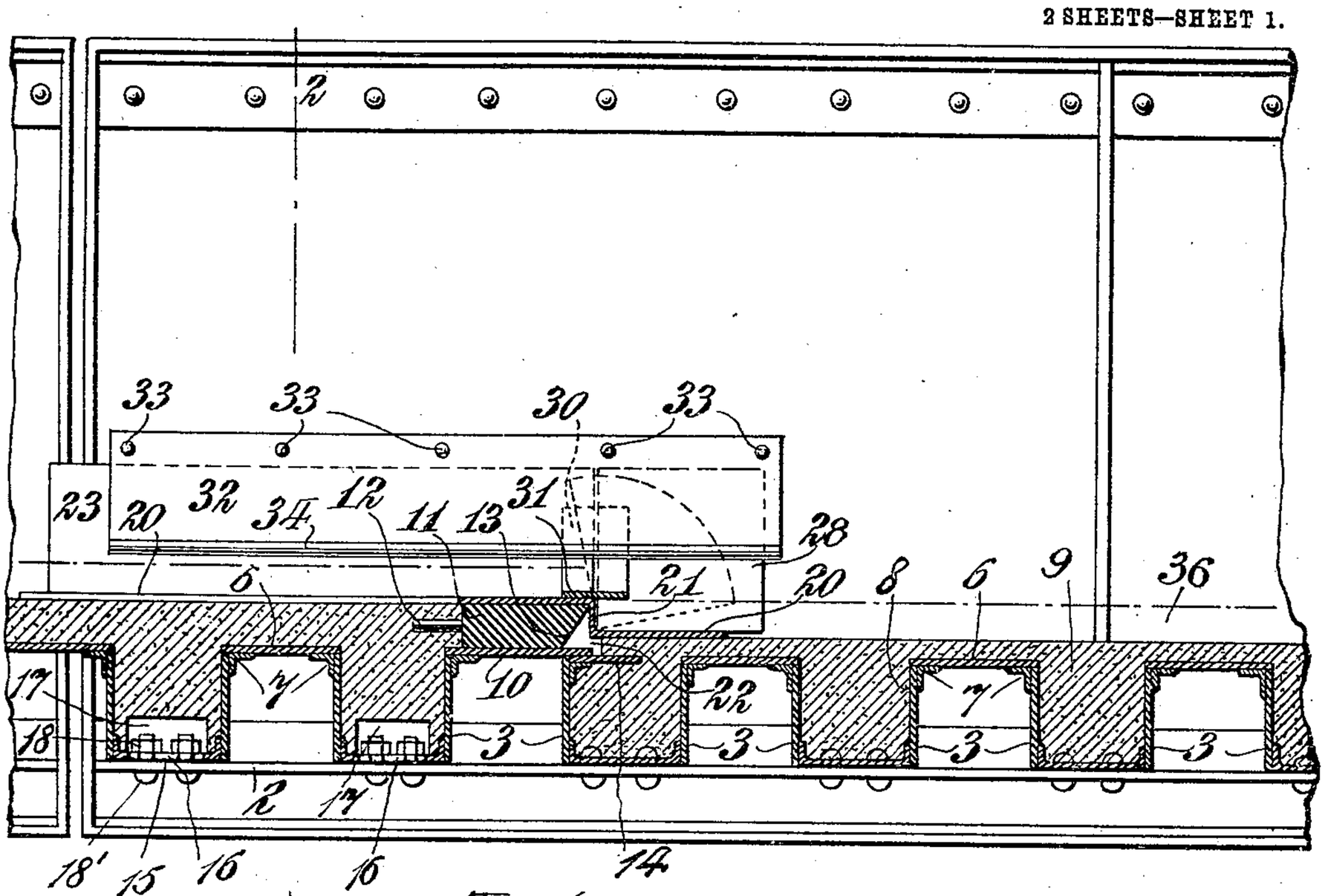

Fig. 1.

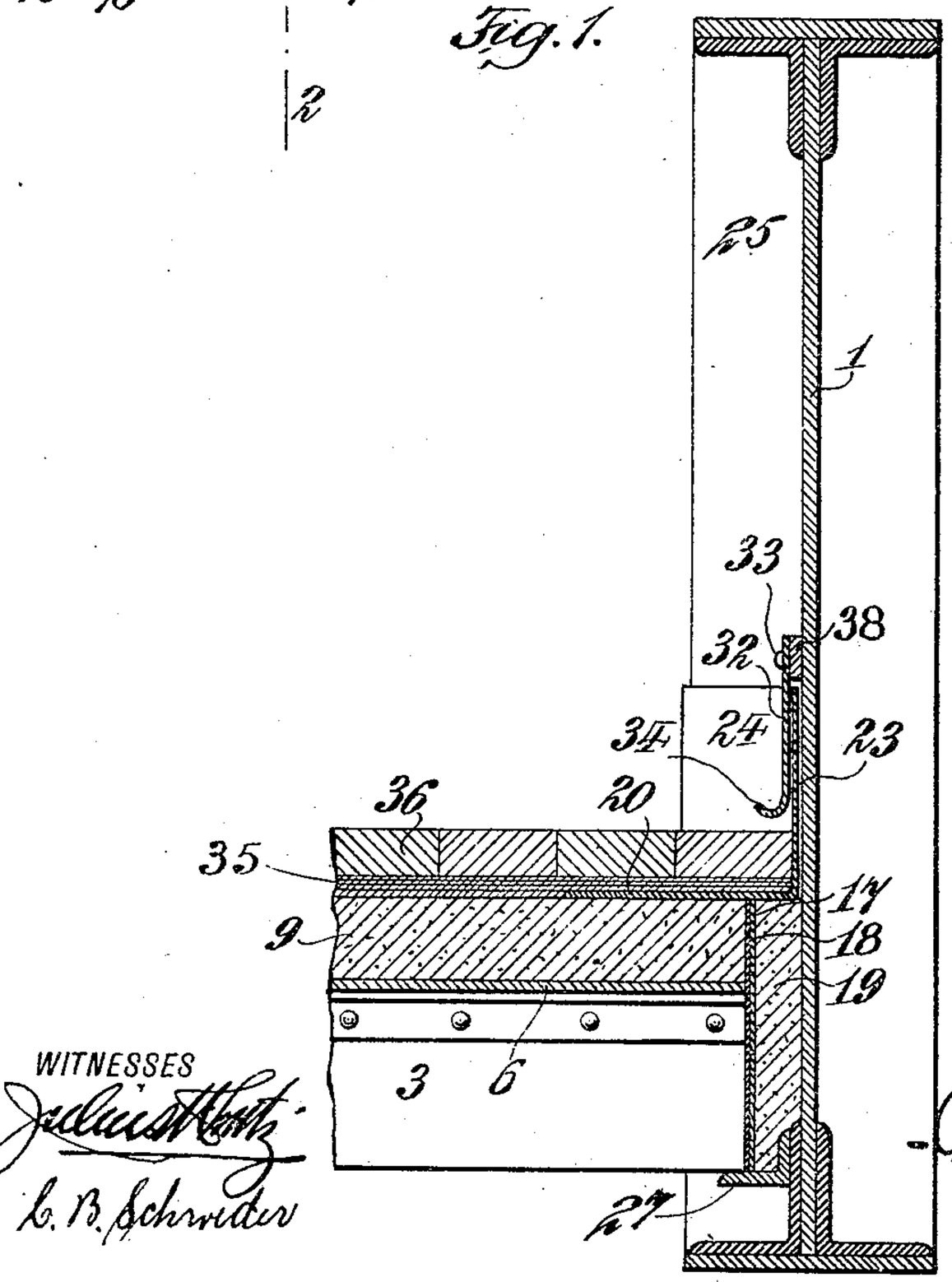

Fig. 2.

WITNESSES

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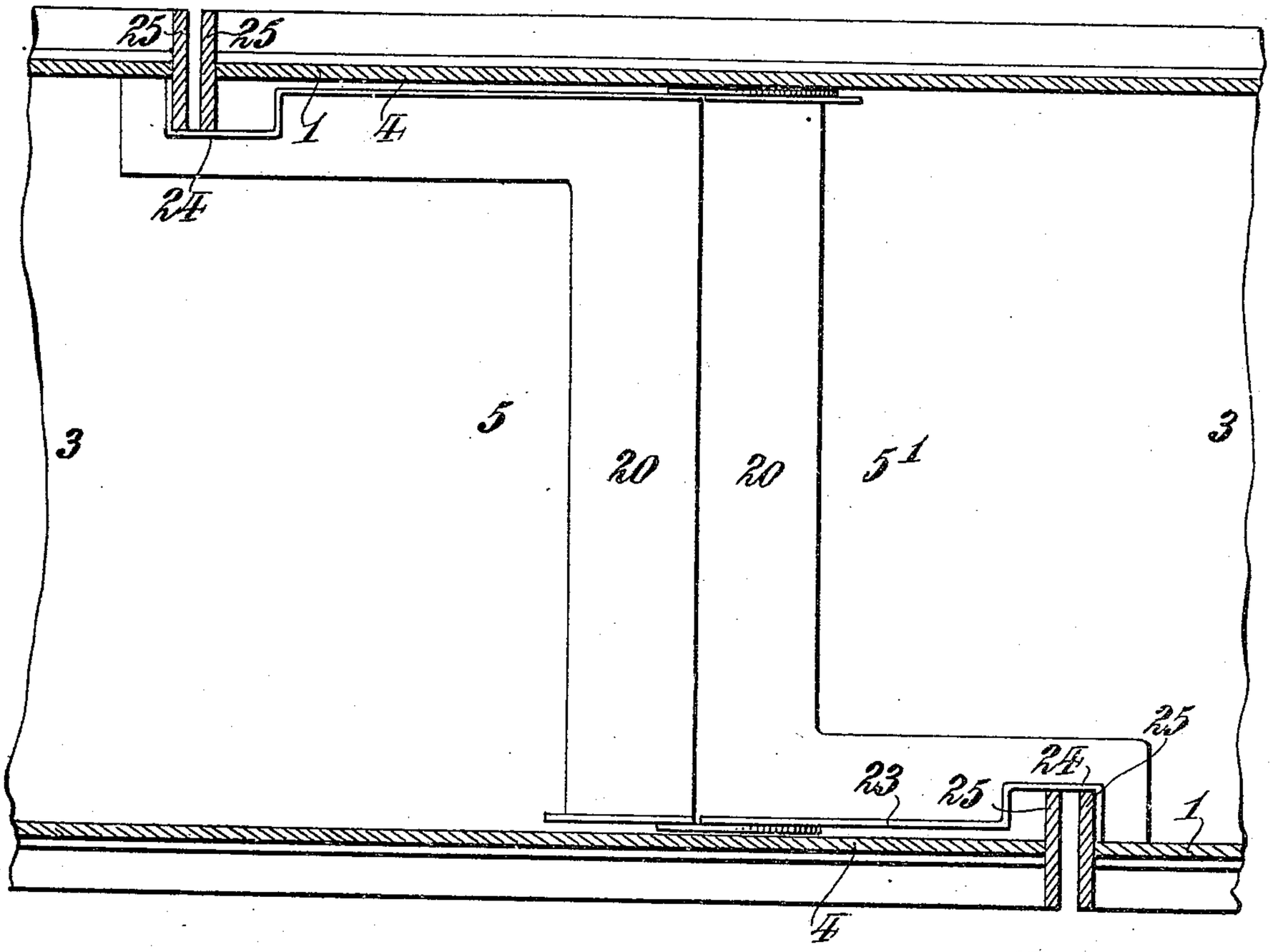

Fig. 3.

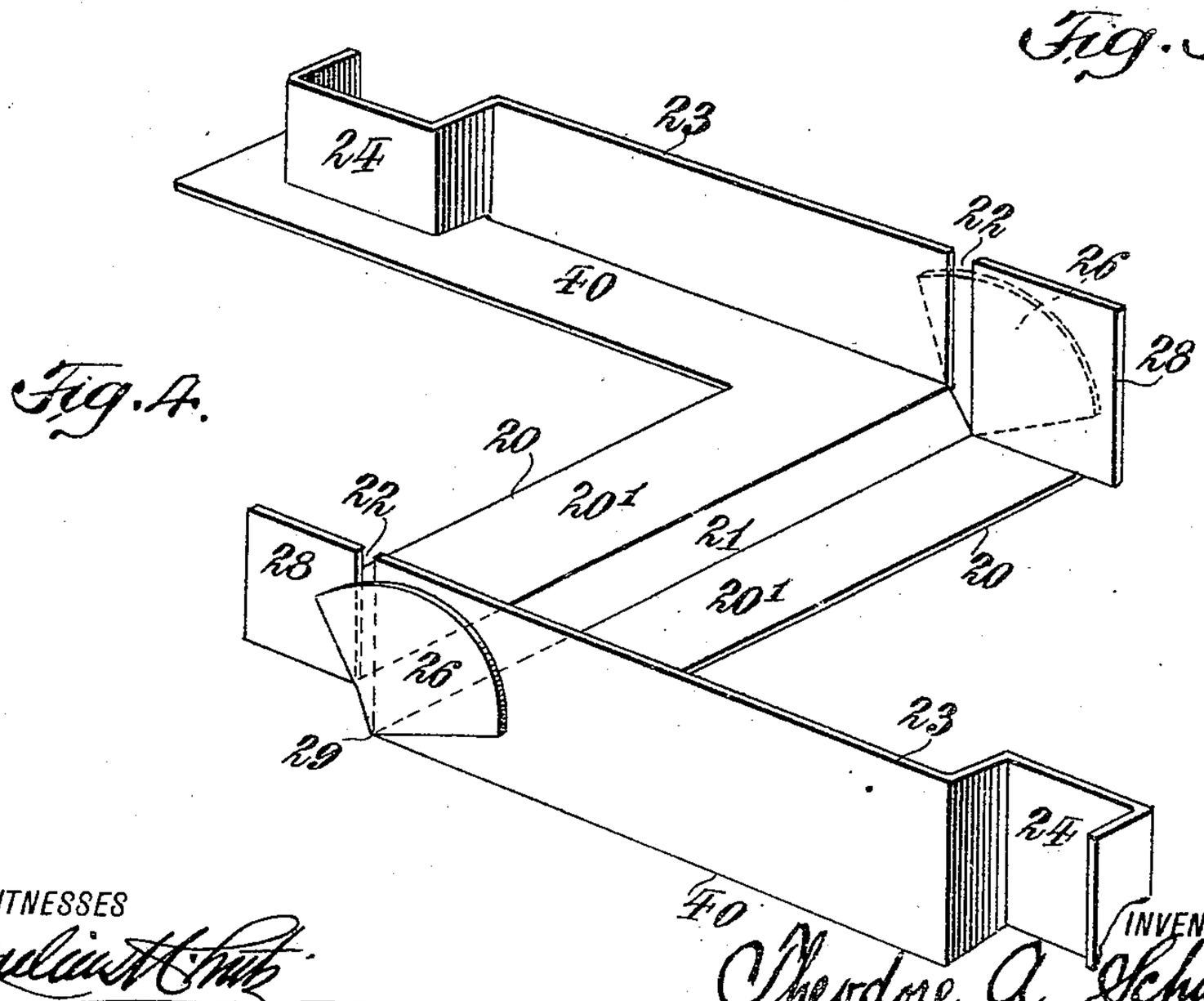

Fig. 4.

WITNESSES

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WATERPROOFING-SHIELD FOR EXPANSION-JOINTS.

951,289. Specification of Letters Patent. Patented Mar. 8, 1910.

Application filed December 14, 1908. Serial No. 467,503.

To all whom it may concern:

Be it known that I, THEODORE A. SCHAFFER, a citizen of the United States of America, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Waterproofing-Shields for Expansion-Joints, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates particularly to means for protecting and waterproofing the expansion joints of highway, railroad and other kinds of bridges, although its use may extend to various structures without avoiding the scope or field of my device.

The object which I have in view is to provide novel and effective devices for protecting all such joints and their associated parts from the corroding and disintegrating effects of rainfall or surface water.

To this end my invention consists in the peculiar features and combinations of parts more fully described hereinafter and pointed out in the claims.

In the present instance and for the purpose of illustrating my device, it is shown applied to an iron or steel bridge wherein the girders and floor are generally composed of metal held together by rivets, bolts, angle-irons, etc., such bridges being in general use.

In the accompanying drawings, Figure 1 represents a longitudinal section through a steel railroad bridge provided with an expansion joint equipped with my improved water shedding and excluding devices. Fig. 2, a vertical section on line 2, 2, of Fig. 1, through one side of the bridge at the joint, both sections of the bridge being constructed similarly. Fig. 3, an exterior top view of the expansion joint, the girders being shown in longitudinal section, and Fig. 4, a perspective view of a sheet metal water-shield composed preferably of thin copper, and adapted to be laid over the expanding and contracting openings in the structure at the joint.

In the present instance the expansion joint shown is the kind used in skew bridges, but my devices are equally applicable, with the same force and effect, to the expansion joint of a rectangular bridge.

The reference numeral 1 denotes an ordinary steel or iron bridge girder, and 2 an angle iron which supports one side of the bridge floor 3 or that portion of the bridge over which tracks are laid and the load moves.

In skew bridges it is sometimes necessary to break the expansion joint of the girders at the opposite sides thereof by alternate extensions 4 of desirable lengths, each of which overlaps the opposite side of the contiguous ends 5, 5′ of the floor system 3. This staggered joint is for no other purpose than to allow the two sections of a skew or other bridge lying upon opposite sides of the joint to expand and contract equally through their length.

The bridge floor 3, which is shown merely as a common type to which my device is applied, is known to the art as a "trough floor", and consists of rectangular plates 6 riveted together by angle irons 7 so as to provide a series of transverse troughs 8 for the reception of concrete 9 which is usually filled in to a point slightly above the tops of the troughs. The vertical sides of the floor at the girders, as seen in Fig. 2, where they are side-lapped by the extensions 4 of the girders are allowed to slide on one another, and protected from chafing by two vertical friction plates 17 and 18, one of which is secured to and moves with the floor sections, and the other to the girders respectively. Concrete 19 fills the space between the plate 18 and girder extension 4 to bring the joint between the plates out where it can be most effectively covered and protected by my devices. The longitudinal joint, thus formed between these two friction plates 17 and 18, is covered over and protected from the inroads of water by a sheet copper shield 20 and its extensions 40 which will presently be described.

In the left-hand half of the bridge, as seen in Fig. 1, the top of the concrete filling is raised to a level above that of the concrete in the right-hand section, thereby leaving a jog between the two sections in which is placed a horizontal transverse plate or block 11 having its top flush with that of the concrete and its bottom resting upon a floor plate 10, being securely held in place by horizontal dowel pins 12 embedded in the concrete. The outer face 13 of this bar 11 is shelving or cut under to allow sufficient clearance as it advances toward the opposite right-hand half of the bridge. The floor plate 10 overlaps and slides upon the

top of a flat plate 14 to form a sliding lap-joint between these two parts. The two trough members 15 of the left-hand section 5 of the floor system are allowed to slide during expansion and contraction on the angle-iron support 27, by means of oblong slots 16, the concrete being chambered out above at 17 to free the nuts 18 and bolts 18′.

The shield 20 for the expansive joint, as will be more clearly seen in Fig. 4, consists of any impervious, non-absorbent waterproof material, but preferably sheet copper, which is cut or formed so as to cover the expansion joint along the sides of the bridge as well as at the transverse gap 22 in the floor, or wherever the joint is most vulnerable to surface water. The shape of the shield may be described as having the general outlines of two L's placed back-to-back and top-to-bottom, with their backs, which are the transverse members of the shield, hinged together by a movable and flexible water-tight web or fold 21. This web is formed out of and is integral with the shield, and is adapted to protect the variable gap 22 between the two contiguous ends of the floor system.

Vertical longitudinal flanges 28 rise from the sides of the shield 20, and press loosely but snugly against the sides of the girders and their extensions 4 to still further prevent ingress of water to the corrodible parts below. Off-sets 24 are formed in the ends of the shield extensions 40 thus to loosely receive end plates 25 of the girder 4 to allow the end plates to creep back and forth therein without buckling the shield. Secured to the opposite ends of the transverse movable web or fold 21 are two vertical fan-shaped gap-closers 26 for closing the vertical side gaps 22 between the opposite outer edges of the shield 20 where the long flanges 23 and short flanges 28 approach and retreat from each other. When the upper or lower edges of the transverse web 21 move forward or backward, the gap-closing plates 26 rock or oscillate on their axes 29 without uncovering the gaps which they protect.

31 is an apron or strip of sheet copper provided with upturned ends 30. This apron is fixed to move with the left-hand bridge section 5, and serves to still further protect the gap 22 from water.

Inasmuch as the vertical sides 23 of the shield 20 must move longitudinally in relation to the girders 1, they cannot be sealed against the girders to prevent water from running down between the girder and said flange. Therefore I have found it necessary and desirable to provide a vertical J-plate 32 which is fastened to the girder at the top by rivets 33, and off-set strips 38. This strip lies parallel with the side of the girder and overhangs and shelters collectively all of the flanges 23, 30 and 28. It also protects the upper part of gap 22, the water being caught by the trough 34 and carried off at the opposite ends of the latter. The off-set strip 38 holds the plate out clear of the girder, leaving a thin vertical space between the two which loosely receives the movable waterproof sheet. To still further render the floor of the bridge waterproof, several layers of water proof, impervious felt 35 are laid over and fastened to the shield 20, and extend over the top of the concrete 9 of the floor-system. Bricks 36 may afterward be laid on top of the felt for protection against injury from possible punctures.

Although I have shown and described a specific structure, it is apparent that my invention might be varied in many ways that would suggest themselves to those skilled in the art, without departing from the scope and spirit of my device.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. A device for water-shedding, waterproofing and protecting the expansion joints of bridges and like structures, which device consists of a flexible impervious, waterproof shield adapted to lie over an expansion joint with the opposite sides of the former rigidly fastened to the contiguous ends of the bridge sections, and having an intermediate foldable portion passing over and movable in and across the gap between said ends, in combination with a covering over said shield.

2. A water-shedding device for protecting the expansion joints of metal bridges and like structures, which device consists of a flexible, non-absorbent waterproof shield adapted to be spread over the joint, and having a foldable horizontal portion to cover the gap between the opposing bridge sections, in combination with vertical gap-closers at the opposite ends of the said foldable portion.

3. A water-shedding device for protecting the expansion joints of bridges and like structures, which device consists of a non-absorbent waterproof shield adapted to be spread over the joint, and being provided with an intermediate folding element covering the gap between the contiguous ends of the bridge floor, in combination with side-extensions provided with vertical flanges, and J-plates overlapping said flanges.

4. In a water-shedding or waterproofing device for the protection of the expansion joints of bridges and like structures, an impervious shield having a foldable portion adapted to cover the gap between the opposing bridge sections, waterproofing material laid over said shield, and paving bricks or the like laid over said material.

5. In a water-shedding or waterproofing

device for the protection of the expansion joints of bridges and the like, the combination with the contiguous separated ends of the floor sections, of movable devices for closing the gaps between said sections in the floor-system and side-portions thereof to protect and cover them.

6. In a water-shedding and waterproofing device for the expansion joints of bridges and the like, an impervious shield provided with vertical side flanges adapted to cover said joint at the sides of the bridge floor, and a J-plate over the vertical side flanges.

7. In a device for water-shedding, protecting and waterproofing expansion joints of bridges and like structures, the combination with the floor system and girders, of a pair of friction plates interposed between the girders and the sides of the floor system, said plates being set off from the girders and having a filling between them and the girders, and water-proofing devices placed over the tops of the friction plates.

8. In a water-shedding, protecting and waterproofing device for the expansion joints of bridges and like structures, the combination of a floor system and girders, with a pair of vertical longitudinal friction plates interposed between the sides of the floor system and the girders and set off from the girders by an intervening filling, and waterproofing and protecting devices placed over the tops of said friction plates.

9. In a water-shedding, protecting and waterproofing device for the expansion joints of bridges and like structures, the combination with a vertical girder and floor system, of a water-shedding web overlapping the edge of the floor system and the vertical wall of the girder respectively to cover the corner joint between them, and a vertical parallel J-plate secured to and offset from the girder and covering over the vertically lapped portion of said web.

In testimony whereof I affix my signature in presence of two witnesses.

THEODORE A. SCHAFFER.

Witnesses:

R. G. Du Bois,

C. B. Schroeder.