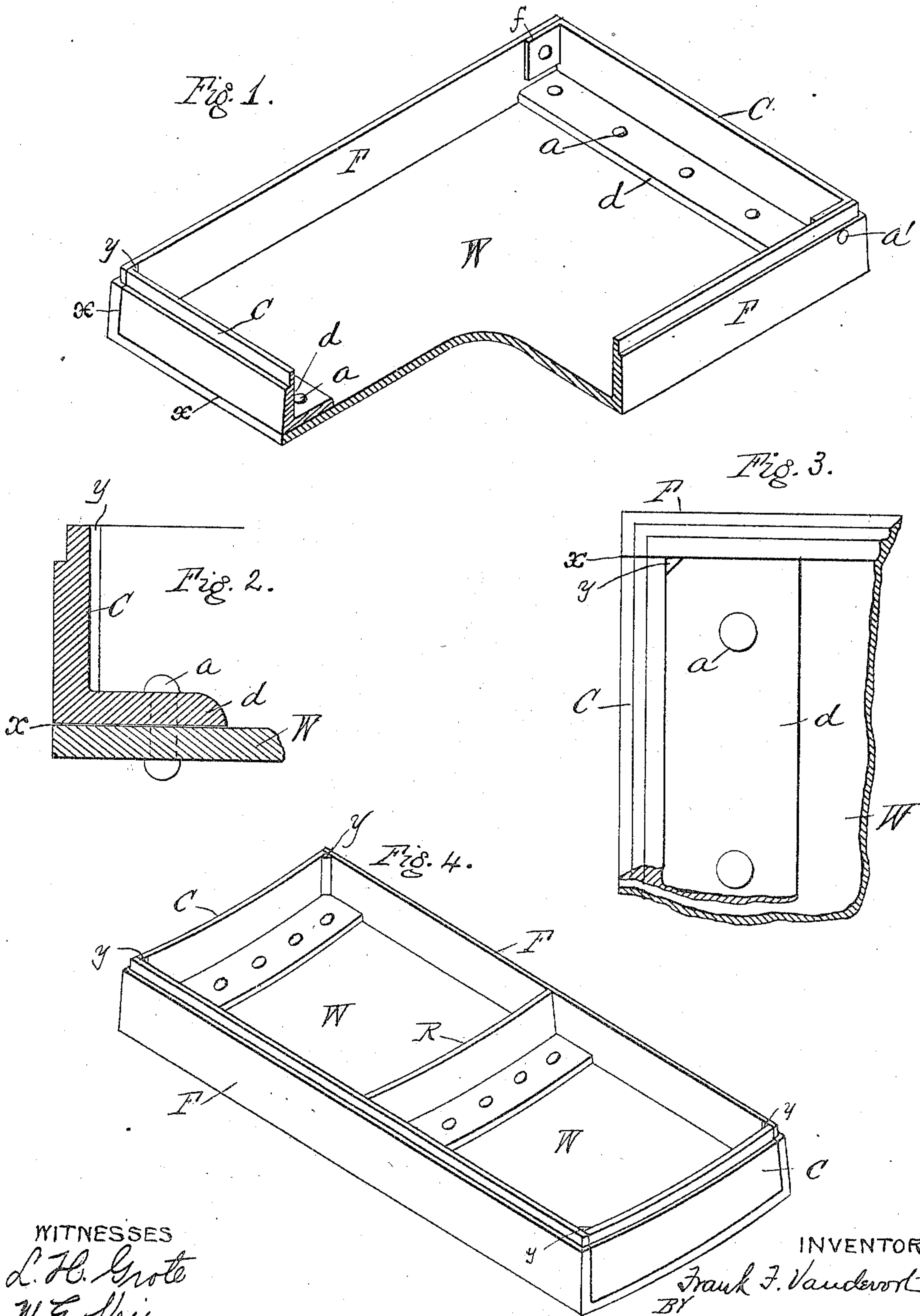


F. F. VANDEVORT.
TUNNEL SEGMENT.
APPLICATION FILED MAY 13, 1909.

951,667.

Patented Mar. 8, 1910.



WITNESSES
L. H. Grote
W. E. Keir

INVENTOR
Frank F. Vandevort
BY
Horn & Horn
ATTORNEYS

UNITED STATES PATENT OFFICE.

FRANK F. VANDEVORT, OF GERMANTOWN, PENNSYLVANIA, ASSIGNOR OF ONE-FOURTH TO HENRY JAPP, OF NEW YORK, N. Y., ONE-FOURTH TO JAMES FORGIE, OF RICHMOND HILL, NEW YORK, AND ONE-FOURTH TO ERNEST W. MOIR, OF LONDON, ENGLAND.

TUNNEL-SEGMENT.

951,667.

Specification of Letters Patent.

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Application filed May 13, 1909. Serial No. 495,638.

To all whom it may concern:

Be it known that I, FRANK F. VANDEVORT, a citizen of the United States of America, residing in Germantown, in the county of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Tunnel-Segments, of which the following is a specification.

My invention relates to improvements in the construction of wrought iron or steel segments for lining tubular tunnels, as set forth in the Japp patent 806,673, December 5th, 1905, and more particularly such as set forth in my Patent 852,916, dated May 7, 1907, and the main object of my present improvements is to make the segments of my said patented invention mechanically stronger than heretofore. This object I attain by constructing the end plates with flanges, and securing them to the channel bar by both welding and bolting.

In the accompanying drawings Figure 1 is a perspective view of a form of tunnel segment embodying my invention; Fig. 2 is a sectional view through the end of such a segment, drawn to a larger scale; Fig. 3 is an inner face view of one corner of the segment; Fig. 4 is a perspective view of a modified construction of tunnel segment.

As in the case of the segment of my former patent 852,916, I first roll a channel of a width suitable for the length or breadth of the desired segment, and the channel may be rolled of a sufficient length to cut two or more segment blocks from it. The web W of the channel may be rolled flat, (Fig. 1), if of narrow width, or curved if desired, as indicated in Fig. 4, and as described in my said patent.

The channel having been rolled or cut to the proper length, I provide flanged end pieces or plates C, the flanges *d* being such that they can be secured by bolts or rivets *a* to the web *w* of the channel, these plates C lying just within the channel flush with the ends of the latter. I may bend the opposite ends of the plates C to form end flanges *f* which can be secured by bolts or rivets *a*¹ to the flanges F of the channel, as indicated at the right hand side of Fig. 1, but preferably I omit these end flanges *f*, as shown at the left of Fig. 1 and in Figs. 2, 3 and 4.

In the claims of this specification I use the expression "bolted" as applied to the

securing of the flanged end plates by either bolts or rivets, as equivalents of each other.

In addition, and either before or after the bolting, I secure the flanged end plates C to the channel also by welding, preferably near the outer edges of the joints between the plates C and the channel. A convenient method of doing this is by the use of the oxycetylene welding process, after the plates have been bolted in place. I have indicated this welding at *x, x*, in the drawings. Where the ends of the plates C join the flanges F of the channel, I prefer to weld by the oxycetylene method along the inside of the corners, so as to produce there fillets *y*, which serve also to strengthen the corner joints. By the construction described, I provide tunnel segments of great strength as well as with water tight joints between the end plates and channels.

Where the tunnel segments are made of considerable length, it may be desirable to add in the channel, say midway between the end plates C, a strengthening plate or bar R, as indicated in Fig. 4, to take the strains upon the segments in the construction of the tunnels.

I claim as my invention:

1. The herein described tunnel segment, consisting of a channel bar with flanged plates bolted and welded to the ends of the web of the channel.

2. The herein described tunnel segment, consisting of a channel bar with flanged plates bolted and welded to the end of the web and flanges of the channel.

3. The herein described tunnel segment, consisting of a channel bar with flanged plates bolted to the ends of the channel and welded along the edges of the joints only.

4. The herein described tunnel segment consisting of a channel bar with plates welded to the web and flanges of the channel at the ends of the latter, and strengthening fillets on the inner corners of the welded joints between the ends of the plates and flanges.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses.

FRANK F. VANDEVORT.

Witnesses:

HERBERT HOWSON,
WALTER ABBE.