No. 892,469. PATENTED JULY 7, 1908.

F. F. VANDEVORT.

METHOD OF MAKING TUNNEL SEGMENTS.

APPLICATION FILED APR. 26, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

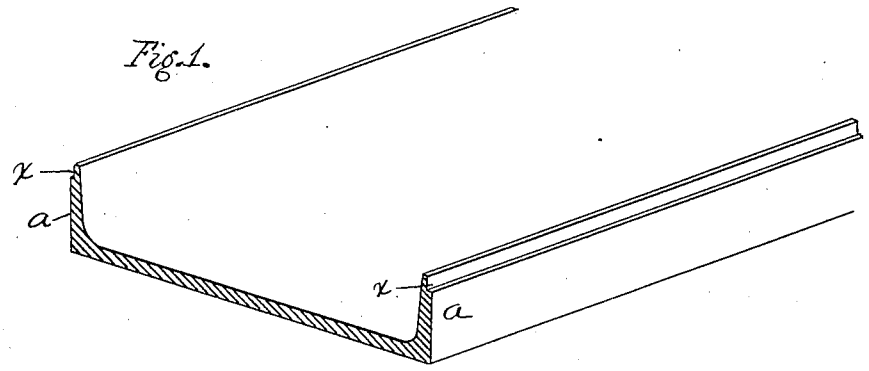


Fig. 2.

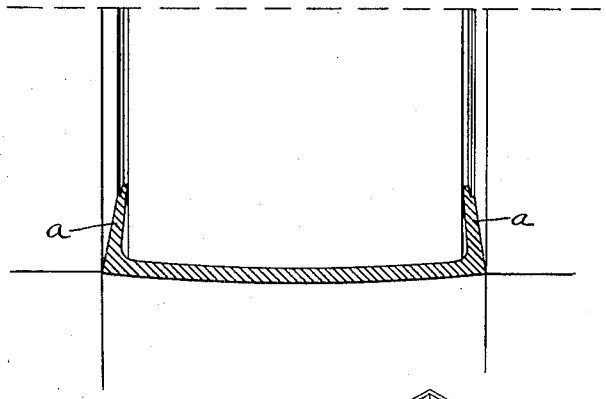
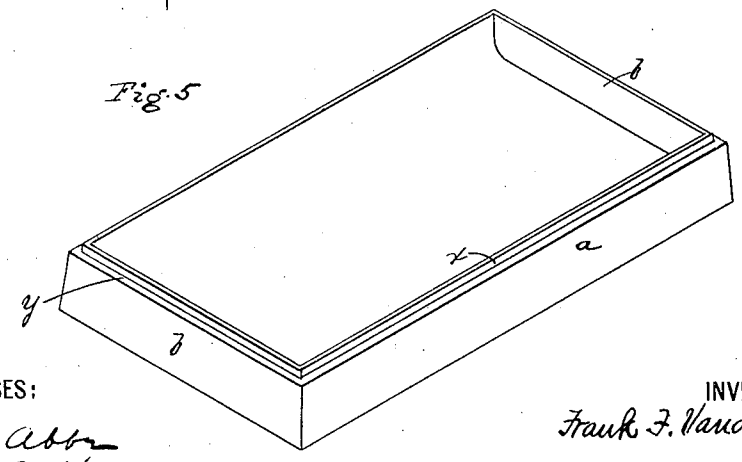


Fig. 5



WITNESSES:

Wallie Abbe

Madge E. Keir

INVENTOR

Frank F. Vandevort

BY

Howson and Howson

ATTORNEYS

No. 892,469. PATENTED JULY 7, 1908.

F. F. VANDEVORT.

METHOD OF MAKING TUNNEL SEGMENTS.

APPLICATION FILED APR. 26, 1906.

2 SHEETS—SHEET 2.

Fig. 3.

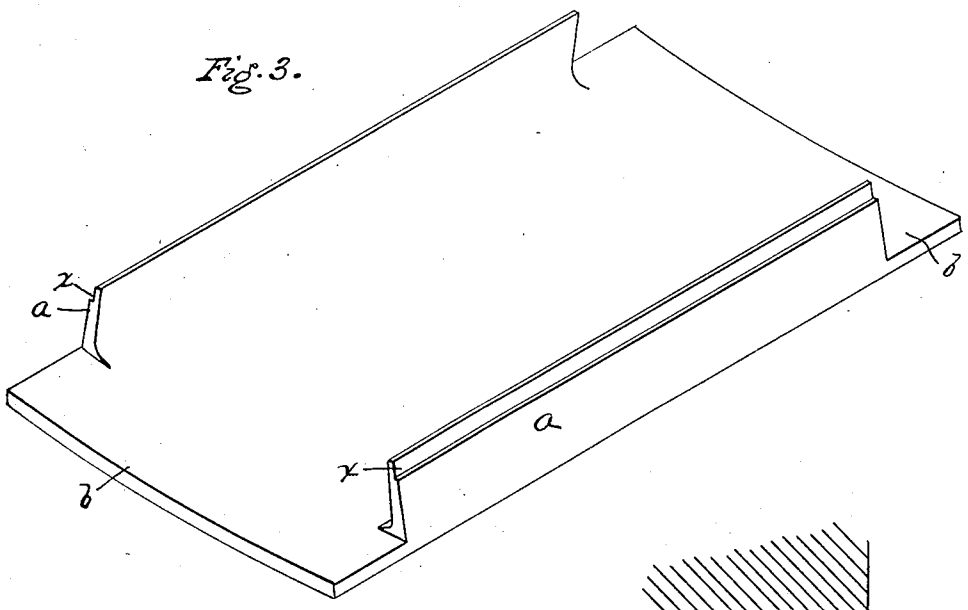


Fig. 6.

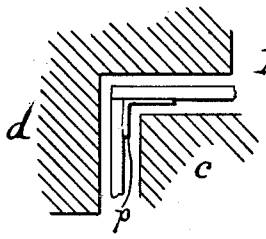


Fig. 7.

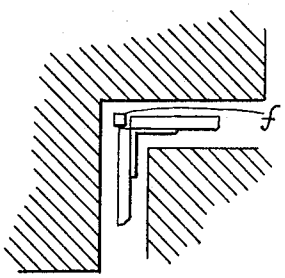
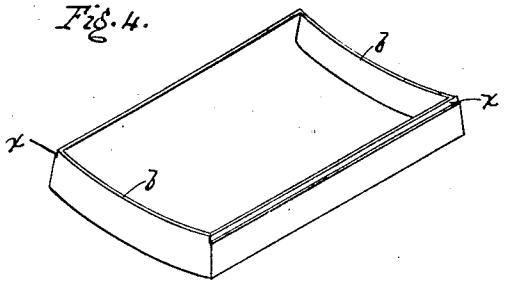


Fig. 4.



WITNESSES:

Walter Abbott

Madge E. Keir

INVENTOR

Frank F. Vandevort

BY

Howson and Howson

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.

METHOD OF MAKING TUNNEL-SEGMENTS.

No. 892,469. Specification of Letters Patent. Patented July 7, 1908.

Application filed April 26, 1906. Serial No. 313,837.

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 a new and Improved Method of Making Tunnel-Segments, of which the following is a specification.

My invention consists of an improved method of making wrought iron or steel segments for lining tubular tunnels, which form the subject of Letters Patent No. 806,673, granted to Henry Japp, December 5th, 1905.

The object of my invention is to make such segments by an economical and efficient method.

In the accompanying drawings Figure 1 is a sectional perspective view showing the first step in my process; Fig. 2 is a view of a pass in the rolls, showing another step in the process; Fig. 3 is a perspective view of the blank at a succeeding stage; Fig. 4 is a view of the forged and welded segment, finished; except for the punching of the bolt holes; Fig. 5 is a perspective view of a modification; and Fig. 6 is a view of an additional operation which may be employed; and Fig. 7 is a view of another modification.

In carrying out my invention, I first roll a channel of about the section illustrated in Fig. 1, and of a width equal to either the length or breadth of the desired segment. The channel may be rolled of sufficient length to cut two or three or more segment blanks from it. I prefer to roll the channel with edge grooves *x* on the flanges (Fig. 1), for the usual calking strips along the flanges of the segments.

I prefer to roll the channel of such size that its width shall constitute the width or length of the segment measured circumferentially of the tunnel when the finished segments are in place. Accordingly, after the channel has been rolled to the form shown in Fig. 1, and while still hot, it may receive one or more passes through rolls to curve it, as indicated for example in Fig. 2, which shows a form of pass adaptable for this curving action. Or this curving may be obtained by a pressing operation. Or where it is not necessary to curve the segment, a flat form as shown in Fig. 5 being sufficient, this curving step may be omitted. The next step in the operation is to cut the curved channel to the proper length and by saws or otherwise to cut off sufficient of the ends of the side flanges *a* of the section to leave aprons *b* at opposite ends of the section, as shown in Fig. 3. Then these aprons *b* are bent up towards, and their edges welded to, the ends of the side flanges *a*, to form end flanges, and so producing the four-sided flanged and curved or flat segment shown in Fig. 4 or Fig. 5, ready to have the bolt holes punched or otherwise formed in the flanges. Grooves *y* may also be formed in the edges of the end flanges *b* for the calking strips.

To accomplish or aid in the welding, and to strengthen the joint, an angle piece *p* (Fig. 6) may be applied in the corner, so that when grasped between the dies *c* and *d* of an electric welding press, the joint will be electrically welded. Or in some cases the apron may be of such width as to permit of the introduction of a square bar or fillet *f* at the outer angle, as seen in Fig. 7.

While I prefer the order of operations described, I do not wish to limit myself thereto. For example, the curving of the segment may succeed, instead of precede, the cutting, and may be produced by other means than rolling.

By the described method of operation, I am enabled to produce economically wrought iron or steel flanged tunnel segments with sharp corners, calculated to successfully stand the strain, stresses, and pressures to which tunnel segments may be subjected in use.

I claim as my invention.

1. The mode herein described of producing wrought iron or steel tunnel segments, said mode consisting in forming a wrought

channel, cutting it to length, removing the ends of the flanges and bending up the aprons thus produced to form end flanges and welding them to the end of the side flanges.

2. The mode herein described of producing wrought iron or steel tunnel segments, said mode consisting in producing a blank with side flanges and end aprons, bending up these end aprons and welding them to to the ends of the side flanges.

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

FRANK F. VANDEVORT.

Witnesses:

MADGE E. KEIR,

EDNA W. COLLINS.