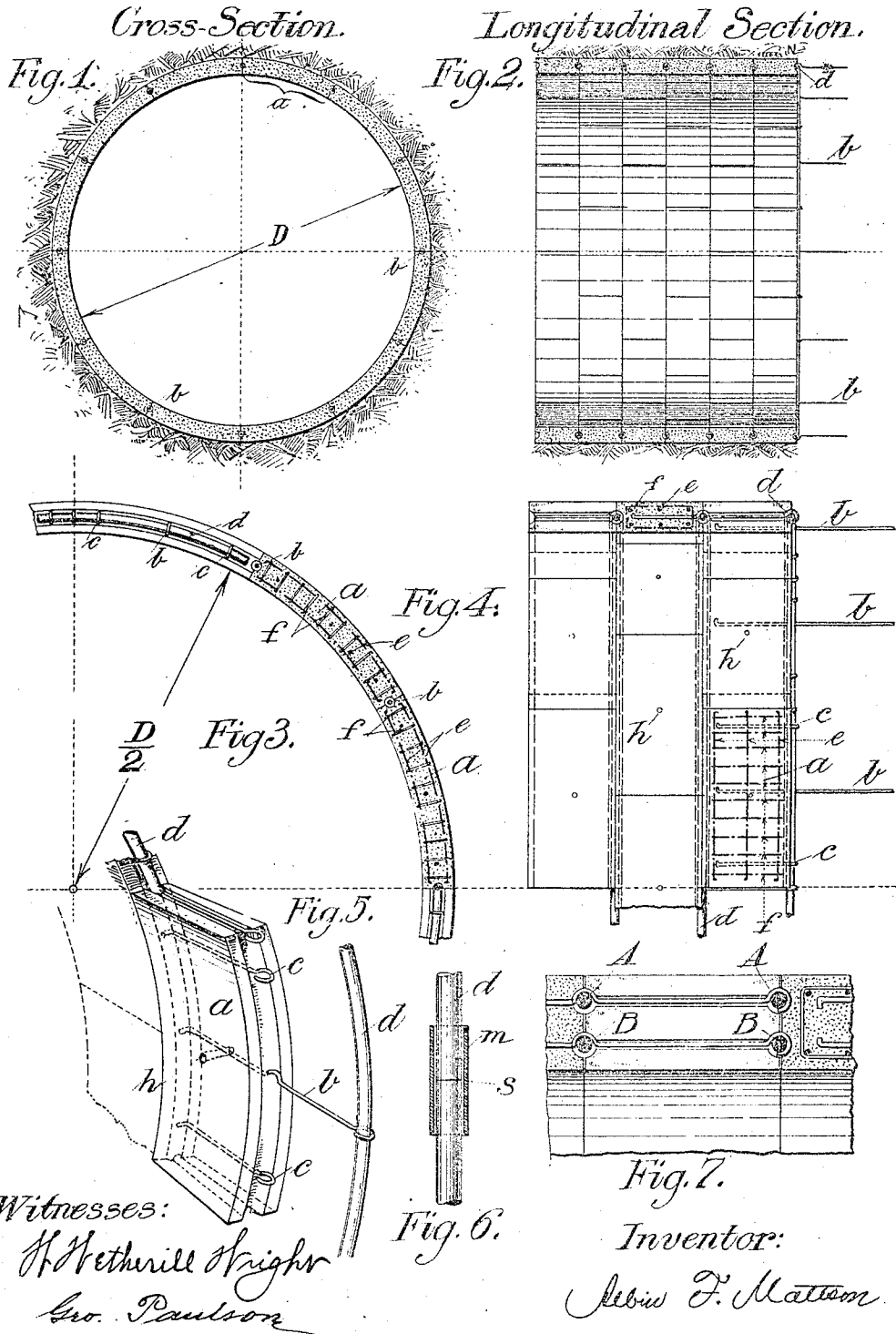


A. F. MATTSON.

TUNNEL LINING OF REINFORCED CONCRETE BLOCKS.

APPLICATION FILED JULY 6, 1905.

2 SHEETS—SHEET 1.



No. 830,345.

PATENTED SEPT. 4, 1906.

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2 SHEETS—SHEET 2

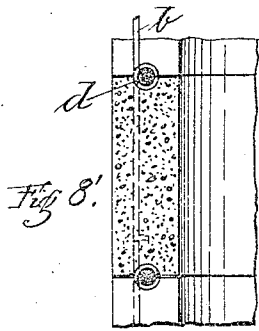


Fig. 8'.

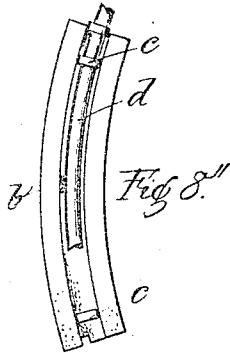


Fig. 8''.

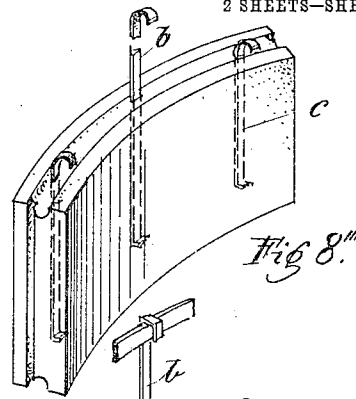


Fig. 8'''.

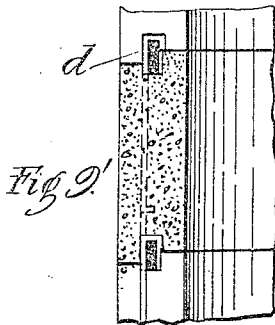


Fig. 9'.

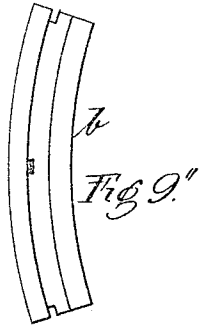


Fig. 9''.

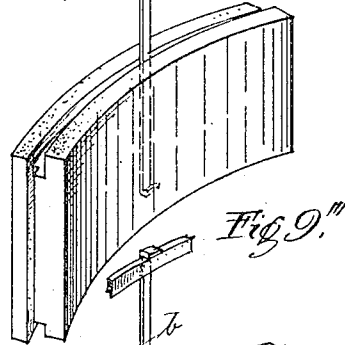


Fig. 9'''.

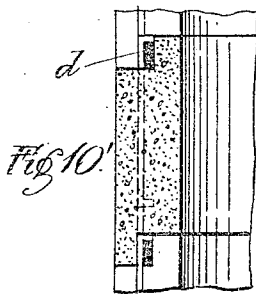


Fig. 10'.

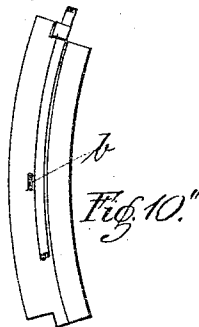


Fig. 10''.

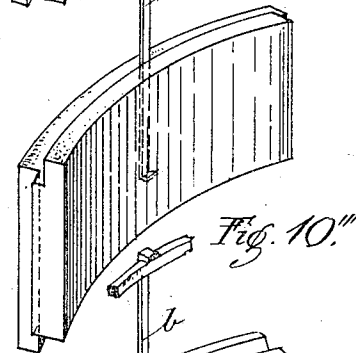


Fig. 10'''.

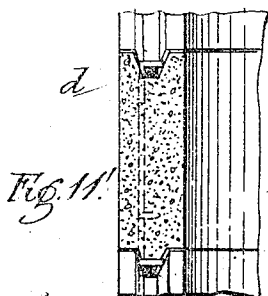


Fig. 11'.

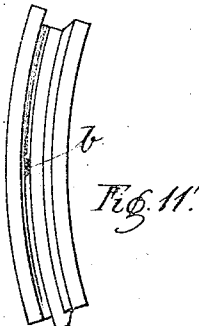


Fig. 11''.

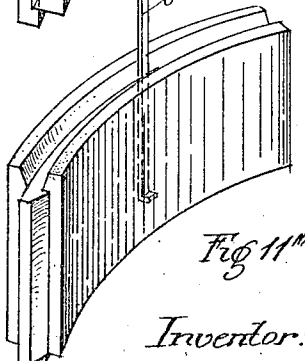


Fig. 11'''.

Witnesses:
W. Rosell.
Geo. Paulson.

Inventor:
Alvin F. Mattson

UNITED STATES PATENT OFFICE.

ALBIN F. MATTSON, OF PHILADELPHIA, PENNSYLVANIA.

TUNNEL-LINING OF REINFORCED CONCRETE BLOCKS.

No. 830,345.

Specification of Letters Patent.

Patented Sept. 4, 1906.

Application filed July 6, 1905. Serial No. 268,380.

To all whom it may concern:

Be it known that I, ALBIN F. MATTSON, formerly a Swedish subject, (but having duly declared my intention to become a citizen of the United States,) residing in Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements for the Construction of Tunnel-Linings and the Like of Reinforced Concrete Blocks, of which the following is a specification.

My invention relates to improvements in the construction of tunnels, sewers, shafts, storage-bins, or the like; and my invention particularly relates to the formation of concrete blocks and the means for securely joining the same together to form a complete structure.

The object of my invention is to make sectional blocks having embedded locking-rods which project therefrom for interlocking said blocks.

A further object of my invention is to provide an interlocking band or tenon which is adapted to fit into grooves formed in the edges of said blocks and secured therein by said locking-rods, which interlocking bands tend to lock the different sections and strengthen the completed structure.

A still further object of my invention is to so arrange the locking-rods of any one block to secure the next adjoining block and also the next succeeding block, so as to more effectually interlock the completed structure.

A still further object of my invention is to reinforce each sectional block by embedding rods therein to strengthen the same, as more particularly described hereinafter.

Referring to the drawings, Figure 1 is a cross-sectional view of a tunnel, showing my invention applied thereto. Fig. 2 is a longitudinal section of Fig. 1. Fig. 3 is a cross-sectional view similar to Fig. 1, showing only a segment thereof, drawn to a larger scale. Fig. 4 is a longitudinal sectional view of Fig. 3. Fig. 5 is a perspective view showing the details of construction. Fig. 6 is a detail view illustrating the manner of joining the interlocking band, and Fig. 7 is a view illustrating the manner of interlocking large blocks by using a double set of locking-rods and also the manner of reinforcing said blocks. Figs. 8', 8'', 8''', 9', 9'', 9''', 10', 10'', 10''', 11', 11'', and 11''' are detailed views showing some of the various forms of blocks for which the improvements are adaptable.

In the drawings, *a* represents the sectional blocks, made of concrete or other material, as desired, and so shaped or curved that when the blocks are joined together they will form the desired shape of the completed structure. The blocks *a* are provided with grooves on their edges to receive the interlocking bands *d* and the locking-rods *b* from the adjoining blocks. The blocks *a* have embedded therein locking-rods *c c* and *b*. Said locking-rods are provided with hooks on their inner-ends to more securely anchor them in the block, and the opposite ends of said rods project beyond the edge of the block, so that they may be locked around the interlocking bands *d*. The locking-rods *c c* are short, as they are to engage the interlocking band *d*, which fits into the edge of the particular block carrying said locking-rods *c c*, while the locking-rod *b* is made long, so as to extend beyond the width of the next adjoining blocks and be locked around the interlocking band for those blocks. The interlocking bands *d* extend around the entire structure, and the ends *S* of said bands may be secured by welding or by a sleeve *m*, as shown in Fig. 6. The blocks *a* are reinforced by embedded rods *e*, extending longitudinally through the same, and by rods *f*, which are bound around the rods *e*, as shown in Figs. 4 and 7, thus adding materially to the strength of the blocks.

The operation of my invention is as follows: The blocks are built together, so as to form a ring conforming to the shape of the tunnel or other structure to be built. The interlocking band *d* is then placed in the grooves formed in the edges of the blocks *a*. The locking-rods *c* are then locked around the interlocking band *d*. The locking-rods *b* are allowed to project beyond the blocks until the second ring of blocks is formed. The second ring of blocks is so placed that the end grooves thereof will receive the locking-rods *b*. Thus the end joints of the first ring of blocks and the end joints of the second ring of blocks will be staggered. The second ring of blocks is then ready to receive an interlocking band, and the locking-rods *c* of the said second ring of blocks locked to the said interlocking band and the locking-rods *b* of the first ring of blocks locked to the same interlocking band. This formation is continued until the structure is completed. The joints between the blocks *a* are filled with cement to form the whole into practically a monolithic structure. Each block has formed

therein an aperture *h*, through which cement may be forced to fill any space which may be left between the blocks and any outside structure. This is of great advantage when the blocks are used as a lining of some other structure. When the blocks are made large for heavy work, the locking-rods and interlocking bands are duplicated, and each block has a double row of grooves formed in its edges. This construction is illustrated in Fig. 7.

In structures of small importance, and especially for vertical construction, I propose to omit the locking-rods *C* and *c* and substitute same with a tongue-and-groove arrangement similar to that shown in Figs. 10''' and 11''', but still use the interlocking band as described.

The locking-rods, the interlocking bands, and the reinforcing-rods *e* and *f* may be made of round or square iron or of irregular formation for the better adhesion of the cement without departing from my invention. Figs. 8', 8'', 8''' to 11', 11'', 11''' show some of the variations which can be made in this regard.

Having thus described my invention, I claim and desire to secure by Letters Patent—

1. In a structure of the character described, the combination of blocks arranged in rows, interlocking bands located between said rows of blocks, a locking-rod having one end thereof secured in said block and its other end extending beyond the next succeeding row of blocks and adapted to be secured to

the interlocking band adjacent said second row of blocks; substantially as described.

2. In a structure of the character described, the combination of blocks arranged in rows, interlocking bands located between said rows of blocks, locking-rods of different lengths secured in each block and projecting therefrom, the shorter locking-rods adapted to be secured to the interlocking band adjacent the row of blocks carrying said locking-rods and the longer locking-rods adapted to be secured to the interlocking band adjacent the next succeeding row of blocks, substantially as described.

3. In a structure of the character described, the combination of blocks having grooves formed in their edges, said blocks arranged in rows, interlocking bands between each row of blocks, a locking-rod having one end secured in a block and its other end secured to an adjacent interlocking band to hold the same to said block, said block also having a longer locking-rod secured therein and extending between the ends of the blocks forming the second row and adapted to be secured to the interlocking band holding said last-mentioned row of blocks, substantially as described.

In witness whereof I hereunto set my hand in presence of two witnesses.

ALBIN F. MATTSON.

Witnesses:

E. ALCORN,
G. PAULSON.