

(No Model.)

J. C. GOODRIDGE, Jr.

METHOD OF CONSTRUCTING UNDERGROUND TUNNELS AND ARCHES.

No. 262,403.

Patented Aug. 8, 1882.

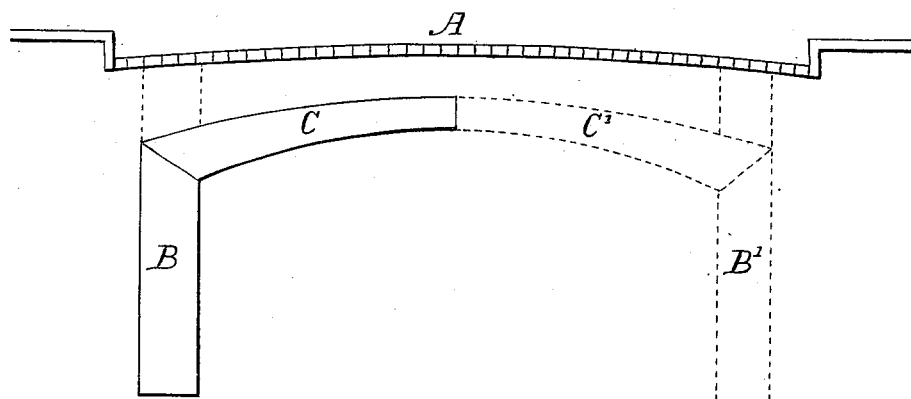


Fig. 1.

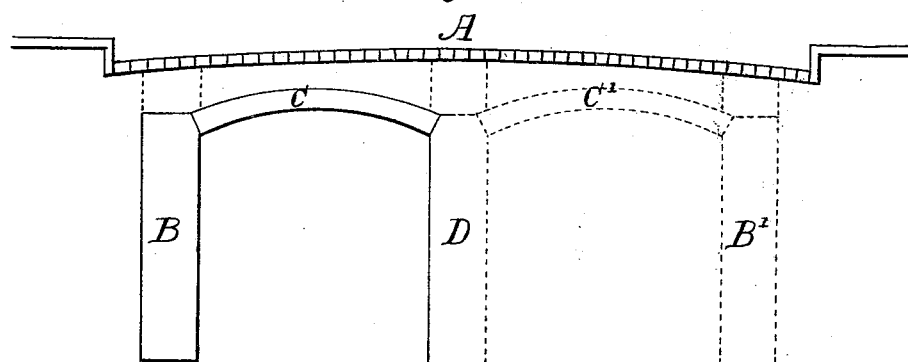


Fig. 2.

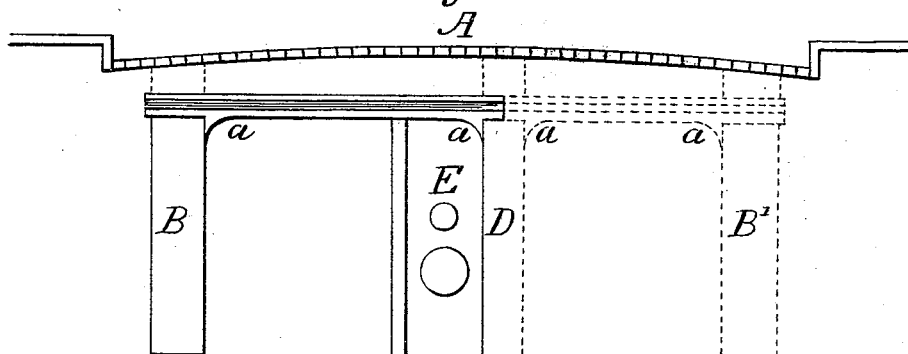


Fig. 3.

Witnesses:
Henry T. Will
Charles & Coe

Inventor.
John C. Goodridge, Jr.
by *Henry T. Will*
his Attorney.

UNITED STATES PATENT OFFICE.

JOHN C. GOODRIDGE, JR., OF NEW YORK, N. Y.

METHOD OF CONSTRUCTING UNDERGROUND TUNNELS AND ARCHES.

SPECIFICATION forming part of Letters Patent No. 262,403, dated August 8, 1882.

Application filed February 18, 1882. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. GOODRIDGE, Jr., of New York city, in the county of New York and State of New York, have invented a new and useful Improvement in Method of Constructing Underground Tunnels and Arches, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to the construction of tunnels, vaults, and arches, more particularly in loose earth or under thoroughfares, the total obstruction of which would be a public inconvenience. It is also of advantage in carrying a tunnel or vault under or near existing structures when a large excavation might jeopardize the stability of such structure.

Figure 1 is a sectional view to illustrate my method when a single arch is to be constructed. Fig. 2 is a sectional view to illustrate my method when a double arch is required. Fig. 3 is a like view to illustrate my method when, instead of an arch, iron girders are used for the same purpose.

In the drawings, A represents a roadway under which it is desired to tunnel. I first sink a trench, B, on one side of the roadway, as deep as may be required for the bench-wall of the tunnel, protecting the sides of said trench by sheet-piling, if necessary. When the said trench B is completed I then fill the same in with masonry or concrete or such other material as may have been selected as the material of the structure. When the said trench is filled to the spring of the arch I then remove half the roadway and the earth from underneath the same, but only down to where the under side of the arch is to come, being careful to disturb the earth below that as little as possible. During this removal care is taken so to conduct the excavation that the bottom thereof, when completed, shall conform in shape to the under surface of the desired arch. After having so shaped and molded the bottom of the excavation it may be covered with paper, canvas, or other material, if a smoother surface is desired; or, if the soil is yielding, boards may be used. Then, upon the centering so made, one half of the arch, C, is built of the selected material, after which the roadway A is replaced above it. When the replaced roadway is ready for use it may be opened to the pub-

lic and the other half of the road closed. Then the bench-wall B' and the other half of the arch, C', are constructed in the same manner. When the entire arch is completed the earth within is excavated, and an invert or pavement may be inserted, if desired.

Should a double tunnel be desired, as shown in Fig. 2, half the roadway would be closed, and the trenches B and D would be sunk and filled. Then the arch C may be constructed, and subsequently the other bench-wall, B', and arch C' would be made, substantially as hereinbefore described. Then the earth within the arch would be removed and an invert or floor be laid, if desired, in the same manner.

Should it be desired to use iron girders, with brick or other arches between the girders, as shown in Fig. 3, the process is still substantially the same. The bench-walls B and D would be made, the girders laid, and the arches be constructed between them, using the natural earth as centering, the roadway replaced, and the earth within the tunnel excavated as before. It would be well in such cases to provide the under surface of the girders with an offset, *a*, so as to receive and meet the lateral thrust, if any, due to the weight of adjacent buildings, &c.

It is obvious that my method offers great advantages in dealing with water, gas, and other pipes, since they may be supported, while the earth within the tunnel is being removed, either from above or below or in any other manner desired; or only so much of the pipe may be exposed at a time as is self-sustaining, and a permanent support provided for that portion before the natural earth around the next is disturbed; or a division of the tunnel may be set apart for that purpose, as shown at E in Fig. 3, wherein the pipes may always be easily reached for repairs. It would be necessary to remove to a distance only that portion of the earth of the roadway which covered the first section of the tunnel. After that the earth would simply be removed back and the preceding section covered therewith.

Having now described my invention, what I claim as new, and desire to patent, is—

The within-described method of constructing underground tunnels or arches, consisting in forming two or more trenches, filling the

same with béton, concrete, or masonry, shaping the surface of the earth contiguous thereto and over where it is proposed the tunnel shall be so as to conform to the inner surface
5 of the roof of the proposed tunnel or arch, building the roof of said tunnel or arch upon said earth, using the same to support the work while in process of construction, and subsequently excavating the earth inclosed between
10 said walls and roof, in order to form the tunnel, substantially as described.

In testimony that I claim the foregoing improvement in method of constructing underground tunnels and arches, as above described, I have hereunto set my hand this 11th day of 15
February, 1882.

JOHN C. GOODRIDGE, JR.

Witnesses:

HENRY P. WELLS,
CHARLES G. COE.