(No Model.)

J. C. GOODRIDGE, Jr.

CONSTRUCTION AND REPAIR OF TUNNELS, CULVERTS, &c.

No. 262,402. Patented Aug. 8, 1882.

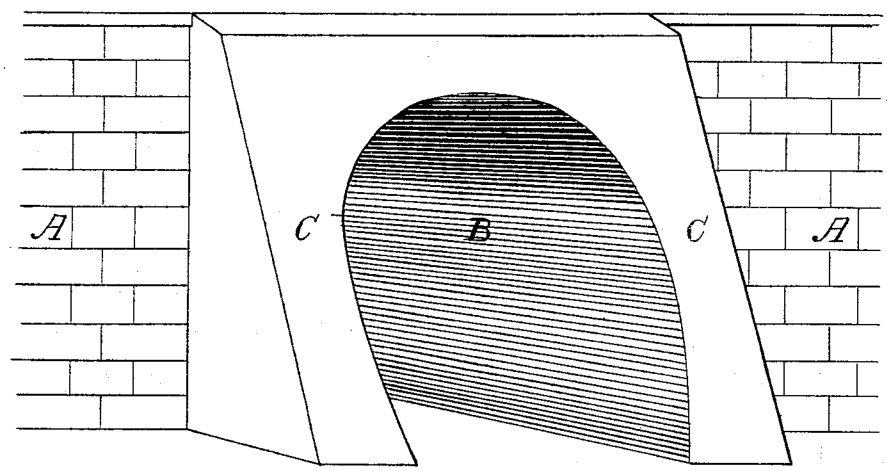

Fig. 1.

Witnesses:
Henry T. Wells
Charles G. Roe

Inventor.
John C. Goodridge Jr
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UNITED STATES PATENT OFFICE.

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

CONSTRUCTION AND REPAIR OF TUNNELS, CULVERTS, &c.

SPECIFICATION forming part of Letters Patent No. 262,402, 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 Construction and Repair of Tunnels, Culverts, and the like, of which the following is a specification, reference being had to the accompanying drawing.

My invention relates to the construction and repair of the openings of tunnels, culverts, vaults, and the like, and more especially such as are located under railroad-embankments.

It is found that where such tunnels, culverts, and the like open through a perpendicular face of masonry, and the same is subject to such severe concussion as is caused by the passage of heavy railroad-trains over them, gradually the surrounding masonry becomes loosened and thrust out of alignment. Water then percolates into the interstices so formed, and through freezing and otherwise hastens the deterioration of the structure. The same result may follow from the weight of an embankment placed above the arch or culvert. Repairs then become necessary, often at great expense, not only in the actual cost of the repairs, but frequently in additional loss caused by obstruction to travel. It has been customary to meet such an emergency by constructing buttresses or wing-walls of masonry bearing against the face of the wall through which the tunnel opens. Such a buttress of masonry is expensive, and it offers to further disintegration only the inertial resistance of its own weight, and that not as a mass, but stone by stone, the upper course being first thrust outward, and then the lower courses in a gradually-diminishing degree. Water would then percolate into the fissures, freeze, and the work of disintegration go on as before. This is particularly true in case of railroad arches and culverts where the concussion of passing trains tends to destroy the bond between the stones of which the wing-wall is composed, and where the same has not been constructed with great care and of great weight. Again, with masonry, it is utterly impossible to support the wall above the crown of the arch, and even if the wing-walls stand and do their duty experience shows that that portion of the wall will then gradually bulge outward, and, unless renewed, will in time be destroyed.

My process is intended to anticipate and prevent this, or repair the same if disintegration has set in.

The drawing represents a tunnel or culvert under a railway-embankment, constructed or repaired according to my method.

A represents the wall sustaining said embankment, through which the culvert or tunnel B passes. I build against the wall A a mold of such form that when the same is filled and its contents have set a buttress, C, is formed, which will bear not only against the wall A, but against the wall over the arch as well, as shown in the drawing. I then fill said mold with béton or concrete in a plastic condition, layer by layer, thoroughly ramming the same and forcing it into all joints, crevices, and irregularities of the surface of said masonry. After the material has set the mold is removed. The opening of the arch will then be found incased and protected by a monolithic buttress, as shown. This buttress has not only the inertia of its own weight to resist the pressure and thrust to which the wall A may be subjected, but it acts as a strut as well. Since it is clear that the wall A or any portion of it cannot be thrust outward without moving the whole mass of the monolithic buttress, and, if the foundation of the buttress is good, from the direction in which the force acts it becomes impossible to move the structure without first crushing the material of which the monolithic buttress is composed. That portion of the wall A immediately above the crown of the arch is also sustained, since that portion of the buttress covering the same is so formed as to transmit any strain applied there to the other portions of the buttress. The face of the buttress should be constructed preferably at an angle of from fifteen to thirty degrees from the perpendicular. This construction allows a broad base and the full action of the strut construction with a saving of material.

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

The monolithic structure or buttress C, herein described, formed by casting in proper layers in a previously-made mold built against the wall to be supported, and around and against the mouth of the culvert, béton or concrete, and then removing the mold as soon as the béton has set, as set forth.

In testimony that I claim the foregoing improvement in construction and repair of tunnels, culverts, and the like, as above described, I have hereunto set my hand this 11th day of February, 1882.

JOHN C. GOODRIDGE, JR.

Witnesses:
HENRY P. WELLS,
CHARLES G. COE.