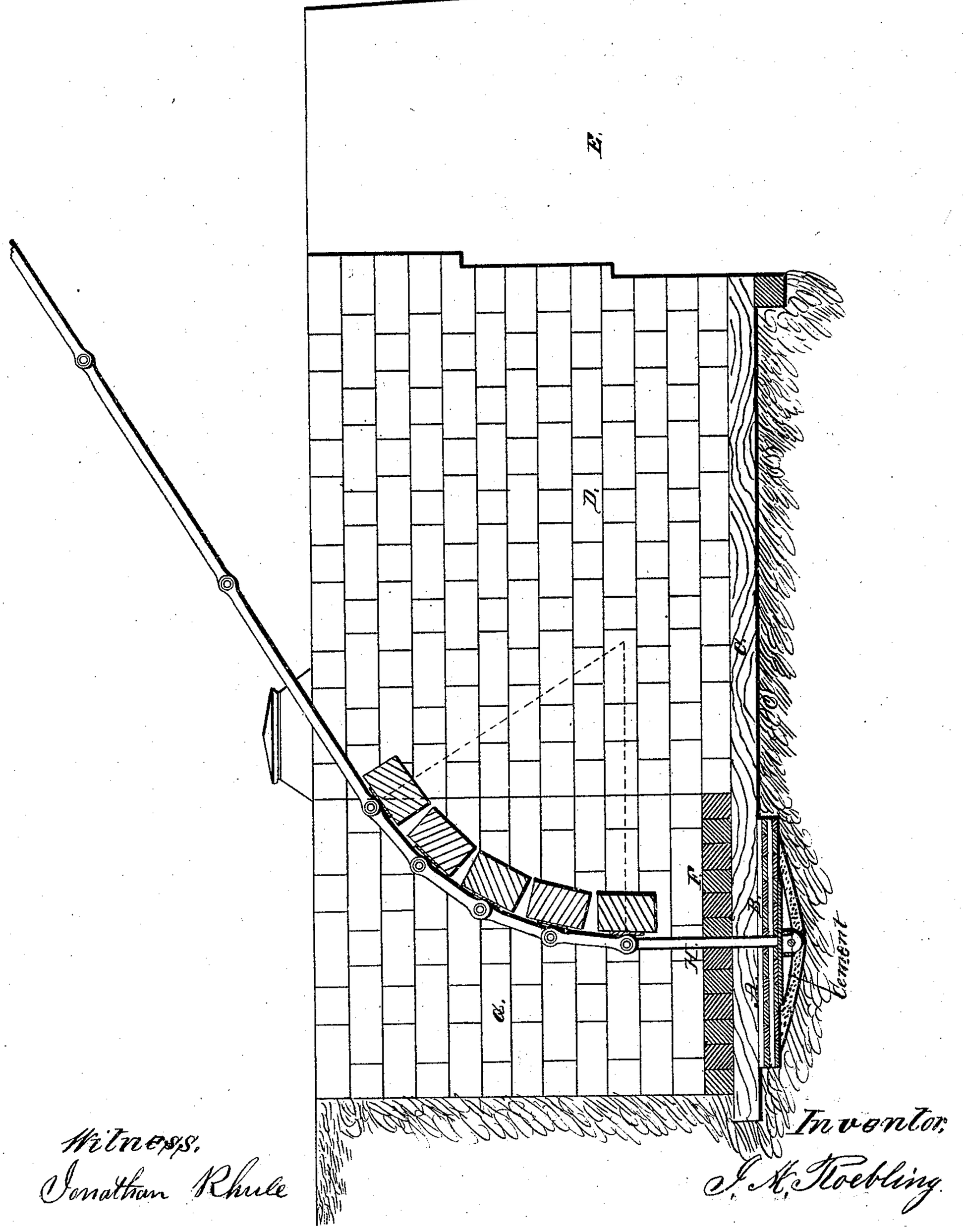
J. A. Roebling.

Suspension Bridge.

No. 4,710. Patented Aug. 26, 1846.



Witness:
Jonathan Rhule

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UNITED STATES PATENT OFFICE.

JNO. A. ROEBLING, OF PITTSBURGH, PENNSYLVANIA.

ANCHORING SUSPENSION-CHAINS FOR BRIDGES.

Specification of Letters Patent No. 4,710, dated August 26, 1846.

To all whom it may concern:

Be it known that I, JOHN A. ROEBLING, civil engineer, of Pittsburgh, Allegheny county, State of Pennsylvania, have invented a new plan of Constructing Wire-Cable or Chain Suspension-Bridges; and I do hereby declare that the following is a full and exact description.

My improvement consists in a new mode of anchorage, applicable to wire bridges as well as chain bridges.

My plan of anchorage differs very materially from the mode hitherto pursued. It is principally calculated for such locations, where there is no rock, and where an artificial anchorage has to be made. In most cases, the practice has been, to resist the pressure of the anchor plates, to which the chains or cables are attached, and which are continued below ground in a straight course, directly by a large mass of solid masonry, constructed either in the form of arches or straight walls, and butting against the abutments, upon which the towers rest, which support the chains or cables. In this case the pressure is transmitted to a small surface of stone wall, which has to be constructed with great care and of the best material to prevent the breaking of the anchor plate and the irregular settling of the masonry. And as the base of this masonry is but small, its extent in length must be proportionally large so as to offer the necessary resistance. In place of resting the anchor plate directly against a stone wall, I apply in my mode a system of timbers, which serve in a manner as a foundation for the superincumbent masonry, distribute the great pressure of the anchor plates over a large surface of masonry, reduce therefore its length or depth, and by its yielding and elastic nature prevent the breaking of the anchor plates. I prefer curving the chains or cables below ground in place of continuing them straight. It is also my practice, to surround all the iron below ground by hydraulic cement and wall it in with solid masonry, in place of leaving an open channel as is the case in most suspension bridges. The cement with which I surround the chains or cables preserves them against rusting effectually. Where greater precaution is desired, the chains may be inclosed in lead.

The accompanying drawing shows a longitudinal section of the plan of anchorage, which has actually been applied by me to the new Monongahela bridge at Pittsburgh. A similar plan was applied to the suspension aqueduct, constructed by me. In both structures the suspension cables connect with anchor chains, made of solid bars. The last or extreme links occupy a vertical position, and every one of the short links rests upon a solid stone block, well bedded in the lower masonry. The bed plate to which the last link is attached, is marked in the drawing by the letter A, it is laid in a thick bed of hydraulic cement. At the end of a bridge, which is suspended to two cables or chains, there are two anchor plates laid opposite to each other. At the Monongahela bridge the distance between these plates is 27 feet from center to center. On top of each anchor plate a platform B is laid down, of about 10 feet square and 8 inches thick, composed of 4 courses of 2-inch white oak plank, the courses crossing each other at right angles, and all spiked together with iron spikes. A thin layer of cement is spread over the anchor plate before the plank is laid down. An opening is left in the center of the platform for the passage of the chain H. The platform being well settled down, leveled and covered with cement, a course of timbers C is laid down next which extends to the abutment E and is as wide as the platform B and composed of white oak sticks hewed 12 inches square and of an even thickness. The two courses C which are opposite each other, serve for the support of the resisting walls D which support the pressure of the curved chains, and also for the support of the main course of foundation timbers marked F. This course is composed of about 12 white oak sticks, 12 to 15 inches thick, 40 feet long and extending all the way across the pit. It serves for the support of the masonry G, the weight of which is to resist the pressure of the anchor plates. This body of masonry being about 40 feet long and 12 feet wide, need not be very deep to offer a sufficient resistance to the pressure of the anchor plates. All the timbers are copiously grouted with thin lime mortar for the purpose of preservation. They will never rot as they are deeply buried under ground and entirely excluded from the air. The success of the above plan of anchorage, which is entirely novel and original in all its features, has been demonstrated on the aqueduct and Monongahela bridge, lately constructed under my superintendence.

What I claim as my original invention and wish to secure by Letters Patent is—

The application of a timber foundation, in place of stone, in connection with anchor plates, to support the pressure of the anchor chains or cables against the anchor masonry of a suspension bridge—for the purpose of increasing the base of that masonry, to increase the surface exposed to pressure, and to substitute wood as an elastic material in place of stone, for the bedding of the anchor plates,—the timber foundation either to occupy an inclined position, where the anchor cables or chains are continued in a straight line below ground, or to be placed horizontally, when the anchor cables are curved, as exhibited in the accompanying drawing, the whole to be in substance and in its main features constructed as fully described above and exhibited in the drawing.

JOHN A. ROEBLING.

Witnesses:

JONATHAN RHULE,

ALEX. MILLAR.