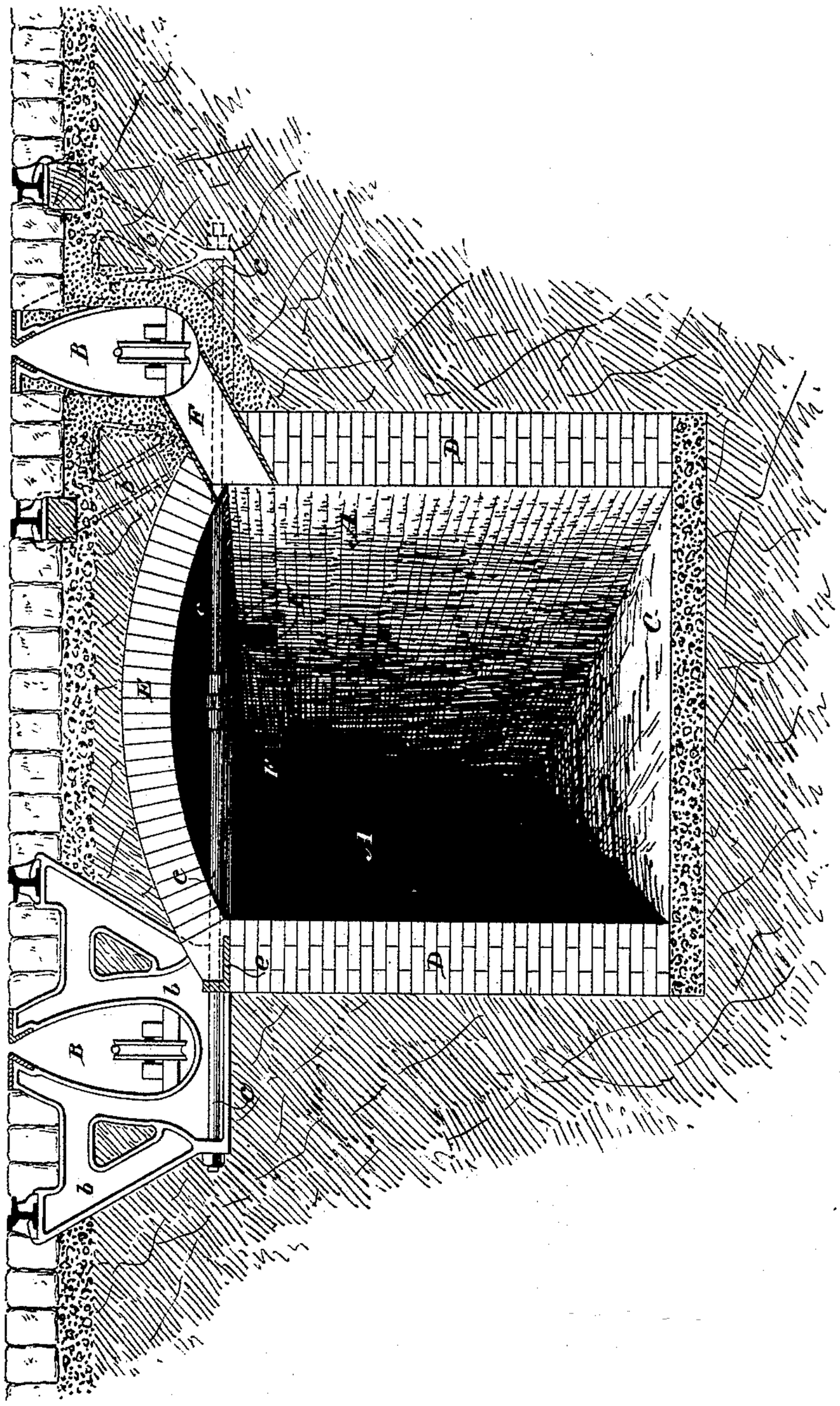
(No Model.)

R. D. RADCLIFFE.

COMBINED TUNNEL AND CABLE RAILWAY.

No. 440,577. Patented Nov. 11, 1890.



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UNITED STATES PATENT OFFICE.

ROBERT D. RADCLIFFE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF TO HANS S. BEATTIE, OF SAME PLACE.

COMBINED TUNNEL AND CABLE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 440,577, dated November 11, 1890.

Application filed March 7, 1890. Serial No. 343,036. (No model.)

To all whom it may concern:

Be it known that I, ROBERT D. RADCLIFFE, a citizen of the United States, residing at New York, in the county and State of New York, have made a new and useful invention in Cable-Railway Conduits when Combined with Subterraneous Passage-Ways, of which the following is a specification.

My invention is directed particularly to the structure of cable ways or conduits and their immediate and necessary connections and to the combination thereof with a separate subterraneous passage-way; and to this end it consists, first, in a novel construction or arrangement between the two cable-ways and a subterranean passage-way, whereby said cable-ways, as well as the roof of the additional passage-way, are rendered more stable or secure.

It consists, second, in the combination of the cable ways or conduits with a separate subterraneous passage-way having ventilating-ways between it and said cable conduits or ways, whereby both the conduits or ways and the subterraneous passage-way are ventilated.

It consists, third, in the combination of said cable-ways and a subterraneous passage having openings or armholes between it and the cable-ways for affording free access to the pulleys and cable attachments.

It consists, fourth, in details of construction and in the general arrangement of parts hereinafter described, but particularly pointed out in the claims which follow this specification.

My invention will be fully understood by referring to the accompanying drawing, which is a perspective view of a tunnel or subterraneous passage-way located beneath and between the advance and return cable conduits or ways of a cable railway shown in sectional elevation beneath the street-pavement.

A is a tunnel or subterraneous passage, and C is its floor, made of concrete, stone, or any preferred material, on which rest the side walls D D, that support the arch E of said tunnel or passage-way.

B B are cable-ways of well-known type, provided with cable-sustaining pulleys supported in yokes *b b*, as shown. The inner edges of the yokes *b b* rest squarely upon angle-irons *e e*, built in the walls D D and adapted to receive the thrust of the arch E. The yokes *b b* have bolt-holes, through which are passed tie-rods or chords *c*, having nuts on their outer ends, thereby adapting the tie-rods to firmly secure said yokes against the ends of the arch E, as clearly shown. Tightening nuts or eyes are provided at intermediate points, as shown, near the middle of rod *c* for regulating the strain between the parts, as the necessities of the case may demand. These tie-rods or chords *c* pass through the angle-irons, and said angle-irons may, if deemed necessary, project entirely under the yokes *b b*, or the yokes and angle-irons may be integral and built into the walls D and arch E. I prefer, however, that they should be separated, thereby allowing for expansion and contraction between the parts without any disintegrating or rupturing effect upon the wall or arch, as there would probably be were they integral.

F F are ventilating-holes between the passage-way A and the cable-ways B B. These passages F F may be located at any desired intervals, and may and do answer for hand-holes for affording access to the cables, the pulleys, and their bearings. With this arrangement of armholes there is no necessity for surface passage-ways to the pulleys, and hence oiling, repairs, &c., may be effected at any and all times to the cables, the pulleys, and their necessary connections without in any manner interfering with surface traffic. The entire means of access to the cables being through the armholes F, the grip-guide may be continuous and never disturbed and the whole structure made more secure and less liable to get out of repair than is now the case with apparatus used in this type of railway traffic. Furthermore, the subterraneous passage may be used for many other purposes, such as will at once suggest themselves to the general public.

In building the entire structure I prefer to construct the archway E first in substantially the same manner disclosed in another pending application filed by me of even date herewith and serially numbered 343,035, and to

build the yokes *b b* and their supported conduits or cable-ways in place and bolt them together, as shown, then to fill the surrounding space about the yokes with concrete, restore the pavement, and put the rails in place, and finally to complete the passage-way A by excavating and building the side walls, as I have disclosed in said application; but this particular method of construction is not insisted upon here.

It will readily be seen that in the compound truss consisting of the arch and the tie-rods with the supported and sustained yokes *b b*, I make a structure which must possess great stability, and that in the subterraneous passage-way A, provided with manipulating and ventilating passages F F, I have at once a system which is durable, cheap of construction, and possessing features of advantage which at once commend themselves to those skilled in the art.

I do not limit myself to the specific construction herein shown, as I believe it is broadly new with me to tie the yokes or supports of parallel cable railways together and to support them by a subterraneous structure; nor do I limit myself to the use of the structure herein described and claimed to cable railways, as it is obviously adapted to electric railways in which the conductors are located in ways beneath the street, and I wish it understood that my claims are of such scope as to include electric railways of this type. I also believe it is new with me to provide means of access to the cable ways or conduits from a subterraneous passage-way, and I desire it to be understood that my claims are of a generic nature.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A pair of conduits or ways supported by yokes abutting against the opposite ends of an arch, and tie-rods connecting said yokes together, substantially as described.

2. In a cable railway, a pair of cable-ways supported by yokes abutting against the ends of an intervening arch, in combination with tie-rods uniting said parts together, the whole resting on the walls which sustain the arch, substantially as described.

3. In a cable railway or analogous structure, a pair of conduits or ways located on opposite sides of and abutting against the ends of an arch, in combination with tie-rods having means for securing said ways and arch firmly together, substantially as described.

4. In a cable railway or analogous structure, a pair of conduits or cable-ways, in combination with a subterranous passage having means of access between said passage and the cable-ways, substantially as described.

5. In a cable railway or analogous structure, one or more conduits or ways for the railway, in combination with a passage-way located parallel thereto and having means of access with the cable-conduit, substantially as described.

6. In a cable railway or analogous structure, one or more cable-ways having a continuous slit or opening in its top, in combination with a passage-way located parallel thereto and having openings into the cable-way, substantially as described.

7. In a cable-way or analogous structure, a passage-way located beneath the street and having openings into the cable way or ways located in close proximity thereto, whereby repairs, oiling, and the general supervision of the cable or cables is had from points below the street-level, substantially as described.

8. In a cable railway or analogous structure, the combination of a pair of cable-ways and an intermediate subterranean passage-way having openings between it and the cable-ways, substantially as described.

9. In a cable railway or analogous structure, a pair of cable-ways, in combination with an intermediate passage-way having openings into the cable-ways, said cable-ways and the passage-way being fixedly secured together, substantially as described.

10. In a cable railway or analogous structure, a pair of cable-ways, an intermediate subterraneous passage having openings into the cable-ways, and an arched roof, yokes sustaining the cable-ways, and tie-rods between the yokes and the arched roof, whereby strength and durability of the structure are maintained and access to the cables is had at points beneath the street surface, substantially as described.

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