

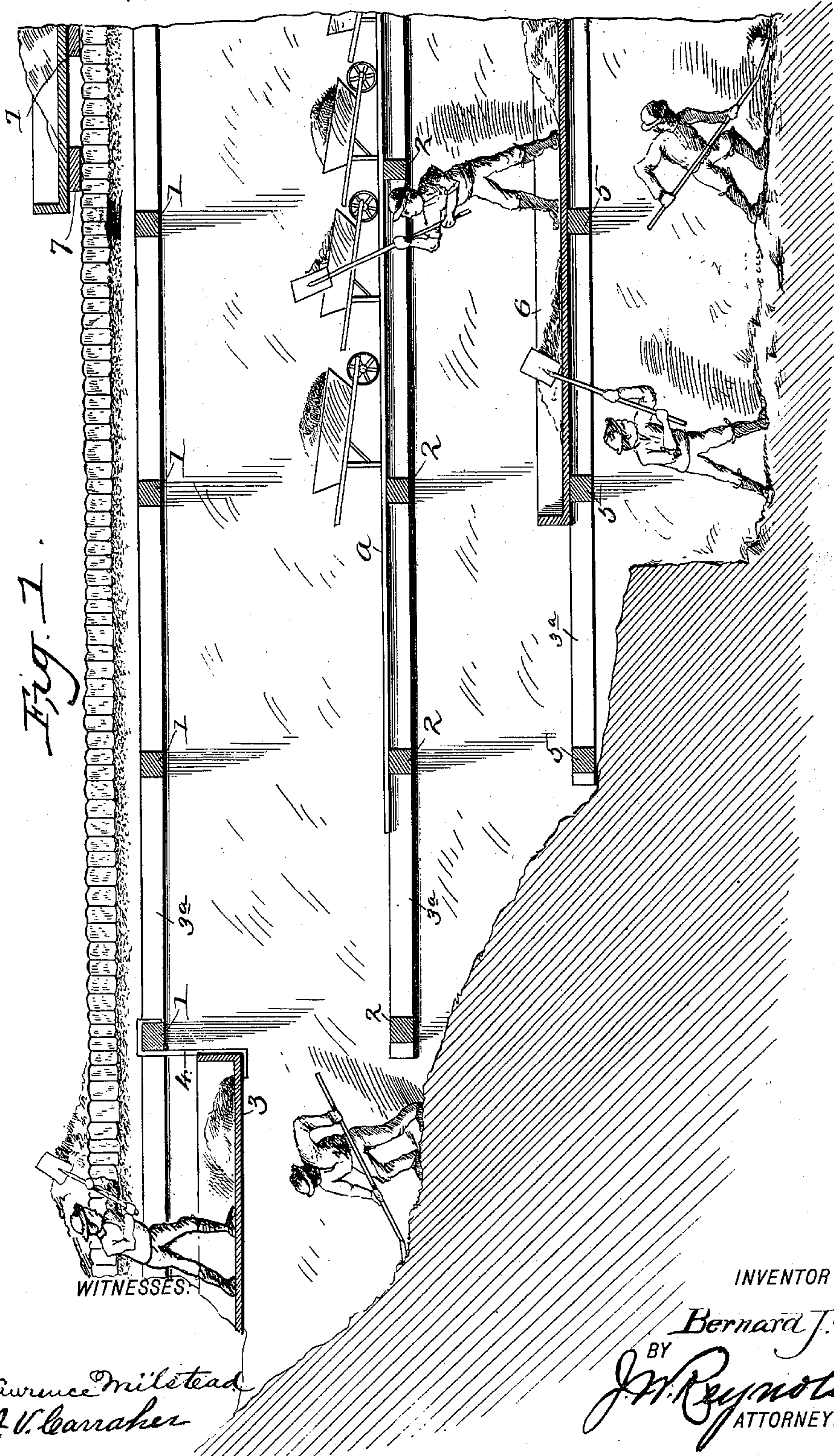
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B. J. COYLE.
SYSTEM OF EXCAVATING AND REFILLING.

No. 518,394.

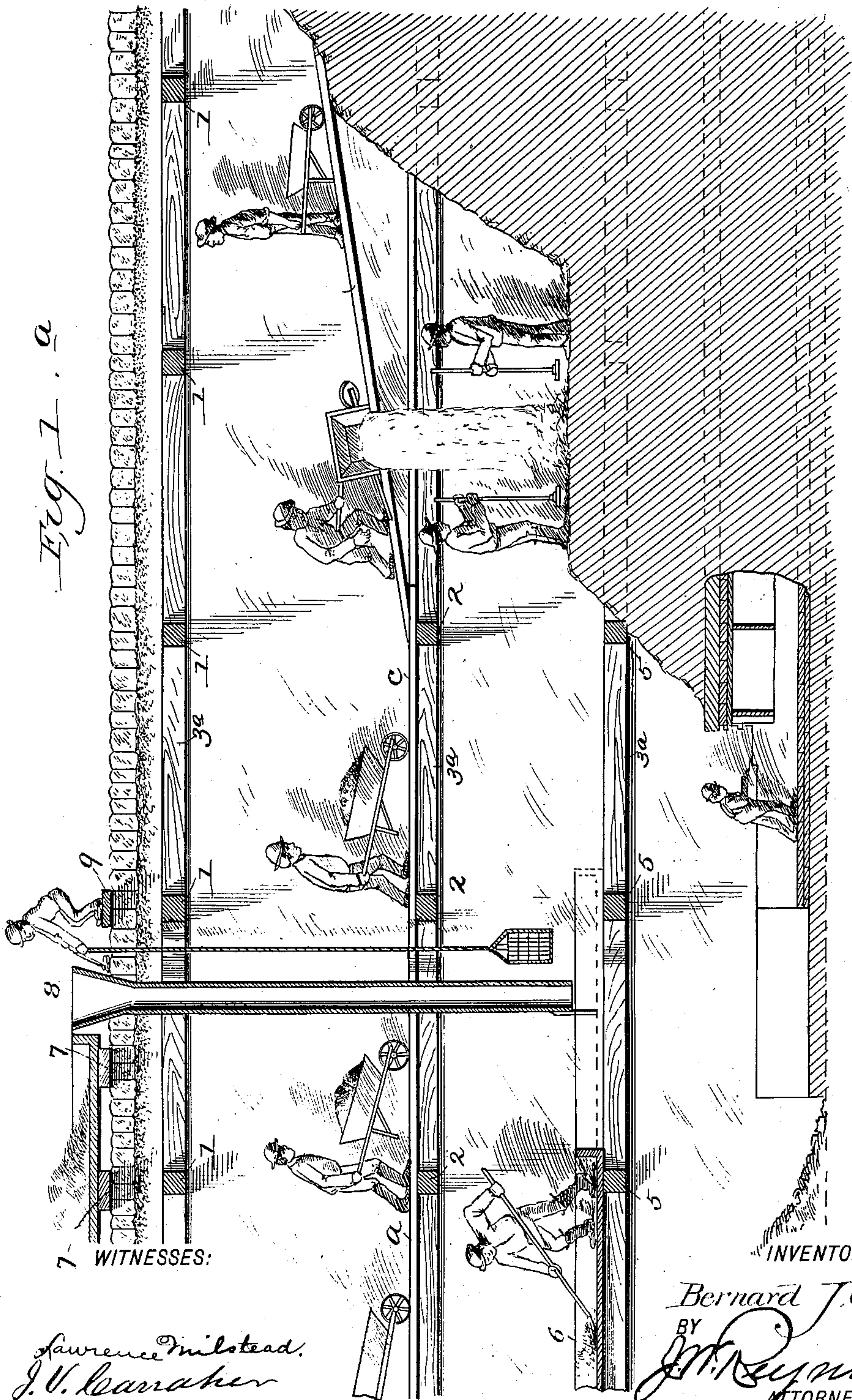
Patented Apr. 17, 1894.



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Lawrence Milstead.
J. V. Carraker

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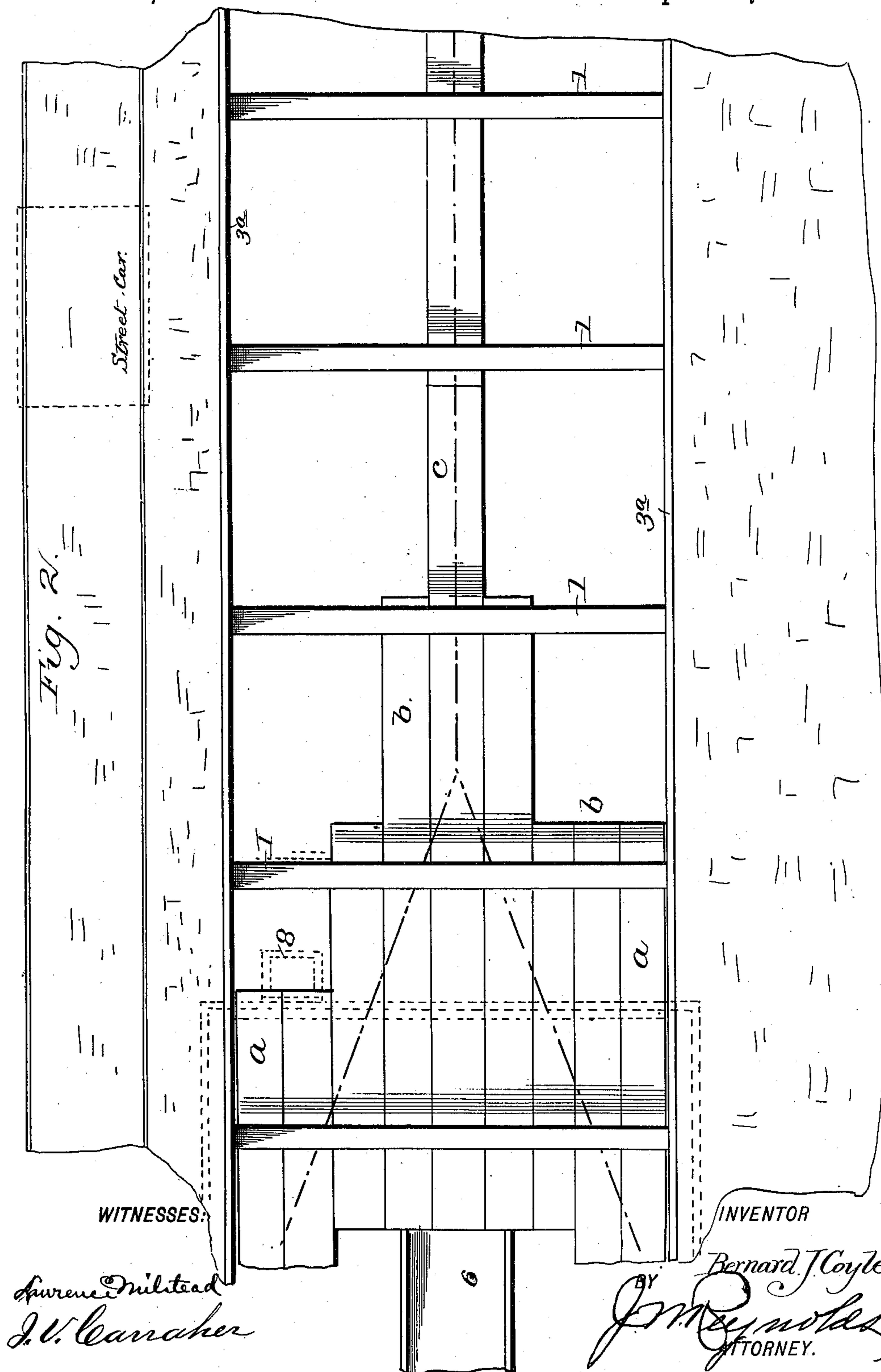
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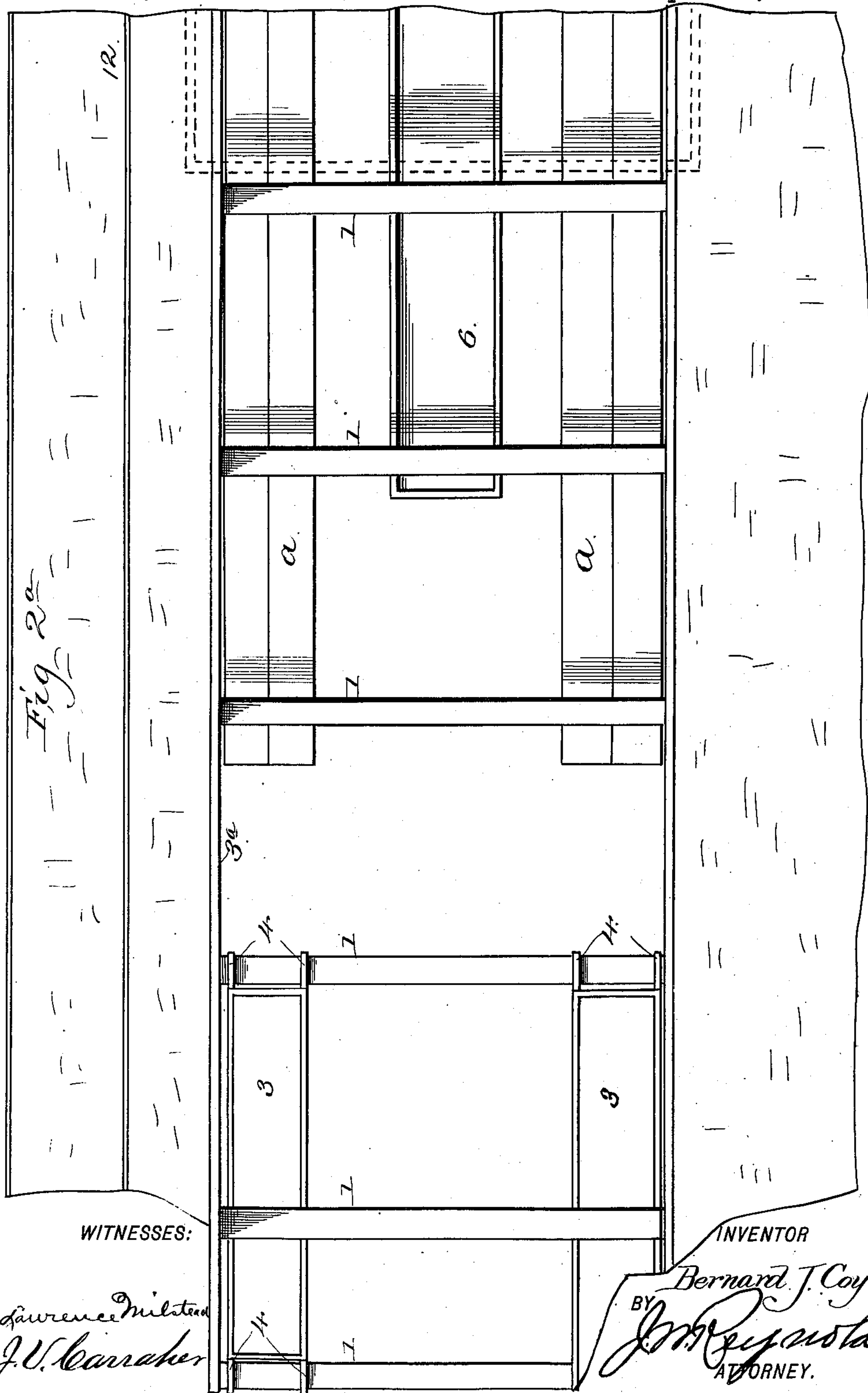
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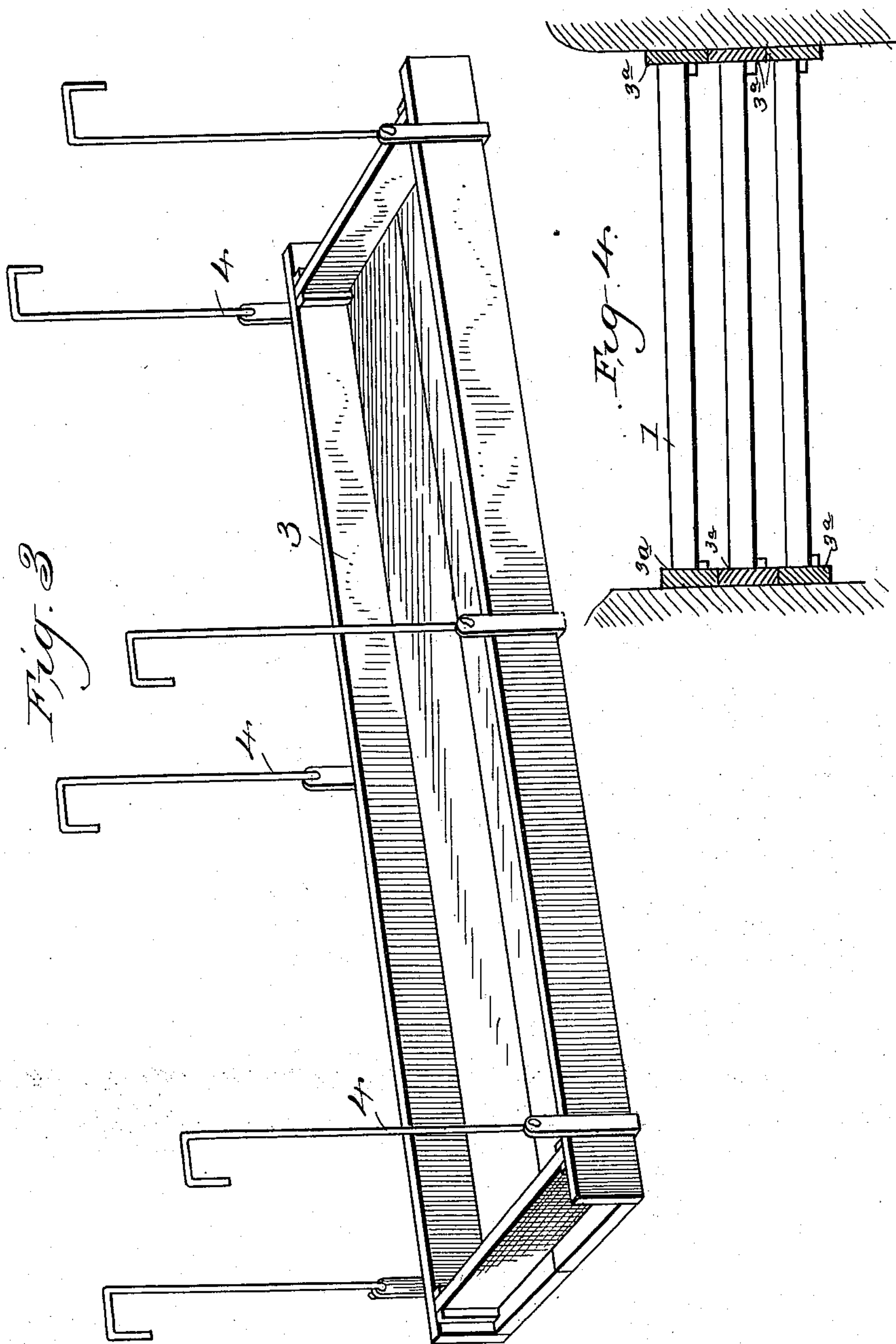
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UNITED STATES PATENT OFFICE.

BERNARD J. COYLE, OF WASHINGTON, DISTRICT OF COLUMBIA.

SYSTEM OF EXCAVATING AND REFILLING.

SPECIFICATION forming part of Letters Patent No. 518,394, dated April 17, 1894.

Application filed May 28, 1893. Serial No. 434,777. (No model.)

To all whom it may concern:

Be it known that I, BERNARD J. COYLE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Systems of Excavating and Refilling; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in laying sewers and other underground conduits, and it has for its object to provide a system whereby the earth may be excavated to form a trench in which a sewer may be built or a conduit laid, and the earth necessary to fill over the arch conveyed directly through the trench, without carrying or elevating it to the surface.

The invention is designed to be employed in cities and other places, and to furnish a means whereby the work of excavating and refilling can be carried on directly within the trench, so that the surface at each side of the trench may be absolutely unobstructed, either by the earth thrown up from the trench, or by the necessary conveyances for transporting the earth from the excavated portions to those to be filled in.

The invention consists, essentially, in a system of excavating and refilling, continuously, as the work progresses, by the construction of ways within the trench and below the surface,—connecting the entire line of work, on which the material may be transported from said point of excavation to the point of deposit as more fully hereinafter set forth. The above mentioned objects are obtained by the means illustrated in the accompanying drawings, in which—

Figures 1 and 1^a represent a longitudinal sectional view of a portion of a street or road bed, showing my invention, and the method of operating the same, and Figs. 2 and 2^a represent a plan or top view of one of the series of ways, and Fig. 3 represents a perspective

view of a suspended tray and its hangers employed in my improved system. Fig. 4 represents a cross-section of a trench, showing a series of stringers and braces supporting the sides.

In carrying out my invention, the excavation is commenced and a section of the trench is opened and excavated for a proper depth, the earth removed therefrom, initially, being immediately taken away to compensate for the displacement caused by the sewer, subsequently laid. The surplus or displacement being removed, cross beams 1 and 2 and stringers 3^a are placed at the proper elevation horizontally, obviating the use of vertical boards for supporting the sides. The cross beams 2 serve to support the ways, upon which the earth is conveyed from the excavation to the place of deposit over the sewer or conduit-section where the filling is required. The ways consist of a series of planks resting on the cross beams 2. These may be variously arranged as circumstances require, without departing from the spirit of my invention.

In the drawings (Fig. 2), the letter *c* indicates the main track of the ways. The said planks are arranged longitudinally in the trench; near the front-end of the excavation or trench the ways are connected by flooring over the open space between the sides; or planks may be located at each side of the trench and the space between them floored over to make a crossing for the conveyances. This enlarges the area of the ways, so as to give room for the conveyances during the operation of loading, and enables the workmen handling the material to convey the same to the place of deposit. The boards *a* in the present instance are extended on each side beyond the crossing so as to leave a central space between them through which the earth may be thrown to the ways by workmen below.

The numeral 3 indicates a tray, one or more of which may be employed and suspended near the forward end of the partly excavated trench in any convenient manner, being shown in the present instance as suspended by means of hangers 4, to the cross beams 1. These trays afford means for, initially, removing a quantity or bulk of surplus earth

corresponding to the ultimate displacement caused by the sewer. The said tray is formed of loose planks laid in the hangers, the sides being held upright by the hangers and the ends held in place by said sides. In deep excavations, additional beams 5, similar to the beams 1 and 2 are extended from side to side of the trench, and stringers 3^a are interposed at their ends, and upon the beams is

laid a tray or series of trays 6, to permit the necessary gangs of shovelers to work, in excavating and elevating the earth to the ways. In many cases as before stated, the planks may be differently arranged from the method just above described; for instance; the forward planks of the ways may be so placed as to have their ends resting directly upon the front portion of the trench and extended forward upon the surface of the same. The ways at the rear end may also be elevated at an angle to permit the earth to be deposited above the level of the horizontal portion of the ways, and the operation of refilling continued up to the surface, without requiring the workmen to leave the trench.

In order to leave the surface of the street entirely unobstructed, (except where occupied by the trench,) for the purpose of preparing the concrete and delivering the building material to the bottom of the trench for the construction of the sewer, beams 7, are extended across the trench, at the surface, and upon these are located platforms on which concrete may be mixed, the platforms being made to occupy a position directly over the trench. This is only possible in connection with my improved system, as all other systems operate above the surface and prevent any such arrangement of the platforms. At or near the platforms may be placed a vertical conveyer 8, having its upper end funnel shaped, so that the concrete used in building the sewer may be conveniently lowered to the desired level in the trench. Cross beams 9 are also laid across the trench, at the surface, to serve as supports for a platform on which bricks or building material may be piled and lowered as indicated in Fig. 1^a of the drawings.

The operation of my system, in detail, step by step, is as follows: The ground is first broken for a proper distance and the surplus earth conveyed directly away. The excavation is continued until a quantity or bulk of earth is removed equal to the ultimate displacement of the sewer, or conduit. The beams 1 and 2 are then set, and the ways are laid upon the said beams 2. The conveyances are then arranged upon the ways at each side of the trench, and the earth is loaded into them directly, as it is excavated. After the excavation has reached a proper depth the beams 5 are laid, the tray 6 put in place as shown in Fig. 1. The excavated material is carried to a point over the completed sewer and dumped, as shown in Fig. 1^a, the depos-

ited earth being compacted by tampers as indicated.

It will be seen from the above description that the gist and essential feature of my invention consists in a system, whereby the entire work of excavating and refilling is carried on wholly within the trench, or the area thereof, thus leaving the surface completely free from obstructions of any kind. It is evident also that by my system the whole operation of excavating and refilling may be carried on noiselessly, thus obviating the disadvantages of machinery operated by steam, which is a source of danger, especially in places where traffic is carried on. Moreover, the active operations of excavating, building and refilling, being carried on underground, protect the workmen from the effects of severe weather hot or cold, and enables them to work with ease and comfort.

Another advantage is that the work of excavating and refilling, after being started is continuous, and the expense of interruptions is avoided, and the work more rapidly accomplished.

Besides the advantages, already enumerated, the system is much more simple, convenient and economical than any system heretofore in use.

Having thus described the nature and operation of my invention and disclosed the advantages thereof, what I claim, and desire to secure by Letters Patent, is—

1. The method of excavating, constructing and refilling in trenches, which consists in excavating a desired length to the bottom in advance; constructing the sewer or other structure, and conveying the material thereafter excavated upon ways within the excavation, and below the ground surface to the rear, and refilling with it upon the constructed work, as set forth.

2. In a system of underground excavating and refilling the combination with the beams located across the trench at its surface, of the dependent tray suspended therefrom, within the trench, substantially as specified.

3. In a system of excavating and refilling in trenches, the combination with the elevated timbers, firmly secured against the sides or suspended from above, of the way or track supported thereon, substantially as specified.

4. A system of bracing open trenches, consisting of a series of horizontal stringers or timbers placed along the same, with cross beams firmly driven and secured to them, thus supporting the sides without vertical planks or sheathing boards, as set forth.

5. The combination with the cross beams and horizontal stringers which brace the sides of the trench, of the ways and the tray located below the same, whereby the earth from the lower portion of the trench may be elevated and conveyed to the point of deposit, substantially as specified.

6. In a system of excavating and refilling,
the combination with the beams arranged
across the trench in which the operations of
excavating and refilling are being conducted,
5 of the platform whereon the concrete is pre-
pared, and the chute whereby it is delivered
to the trench below, substantially as specified.

In testimony whereof I affix my signature in
presence of two witnesses.

BERNARD J. COYLE.

Witnesses:

J. V. CARRAHER,

LAWRENCE MILSTEAD.