

Nov. 1, 1927.

1,647,448

W. F. JONES

METHOD OF CONSTRUCTING AND INSTALLING SUBAQUEOUS CONDUITS

Filed Sept. 30, 1926

3 Sheets-Sheet 1

Fig. 6.

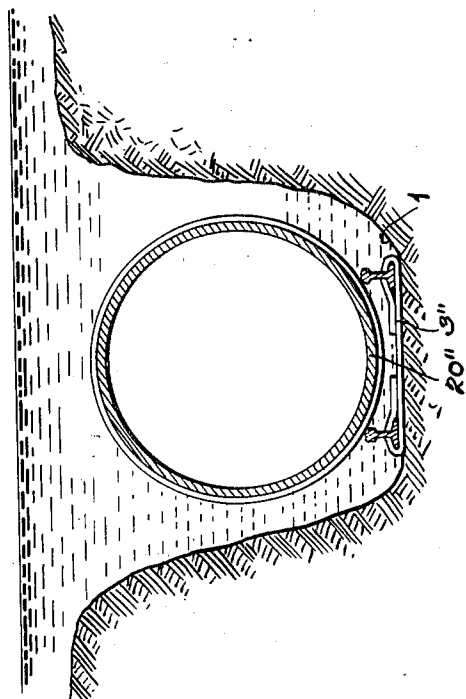


Fig. 1.

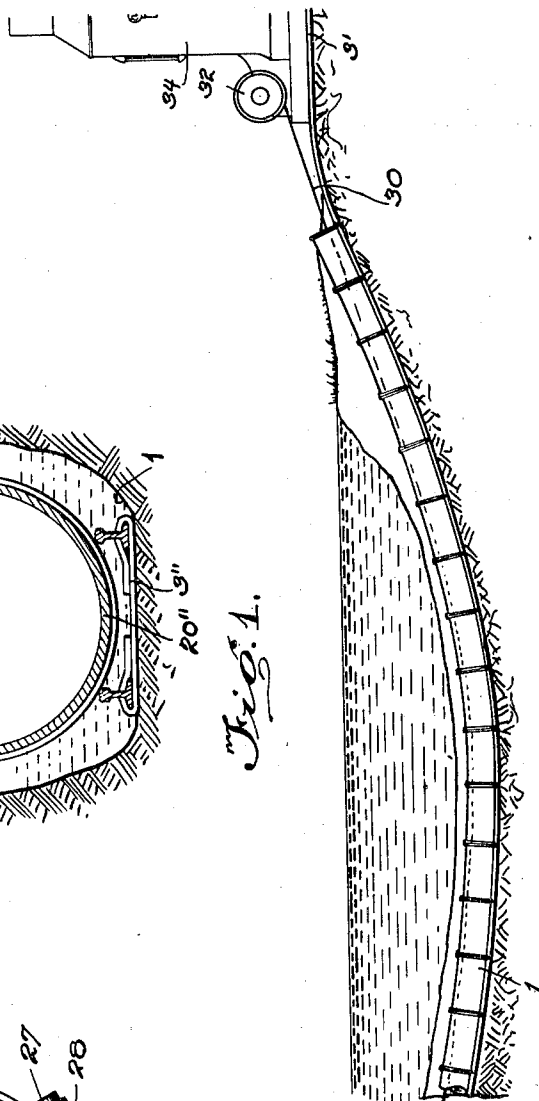


Fig. 5.

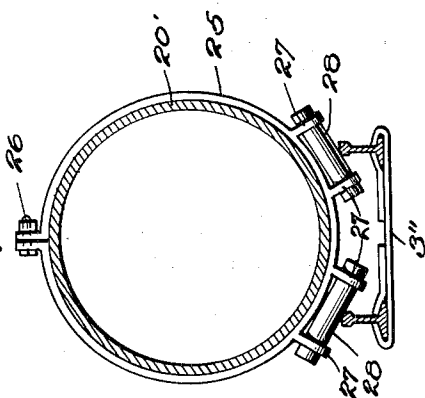
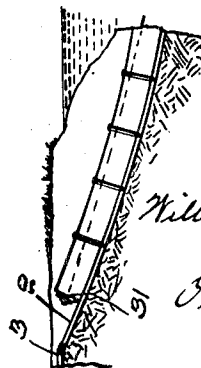


Fig. 4.



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Fig. 2.

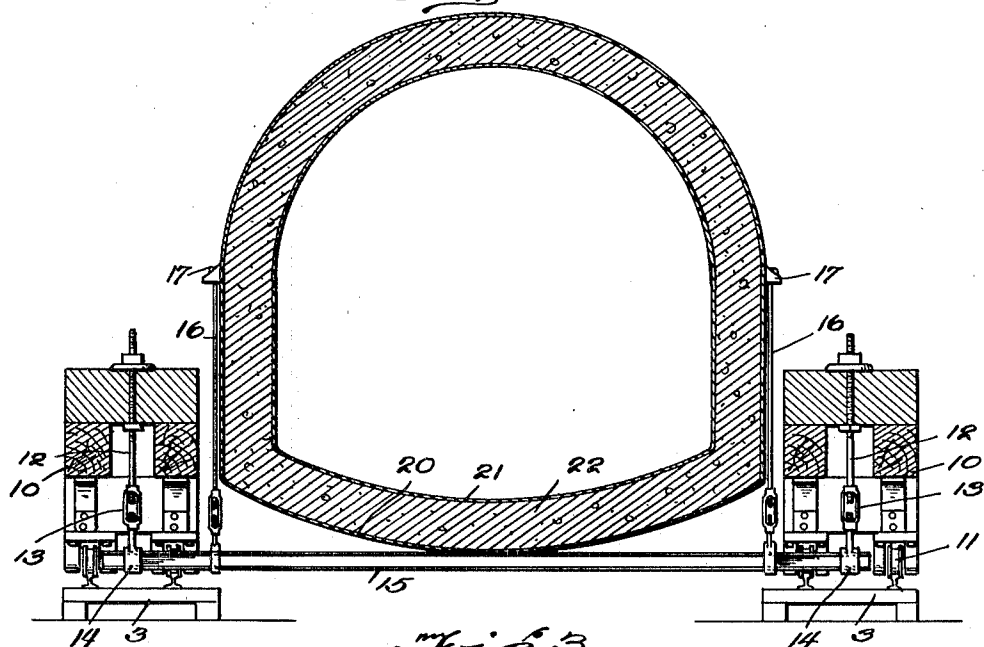
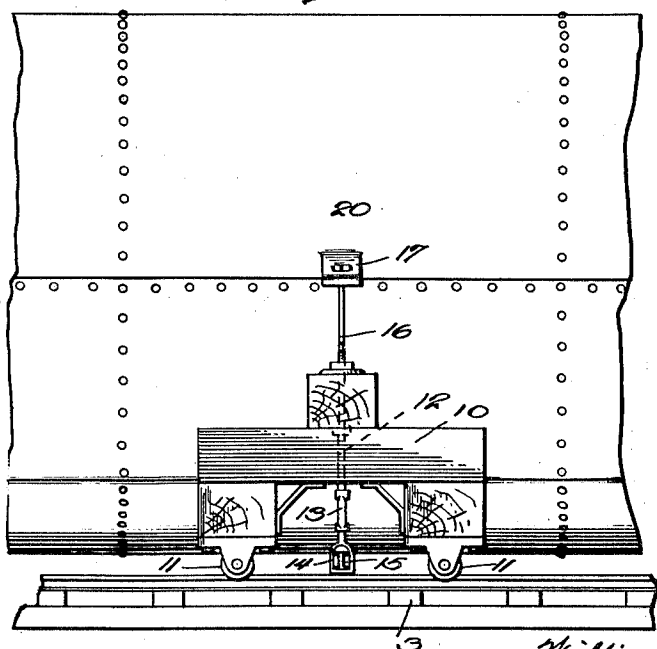


Fig. 3.



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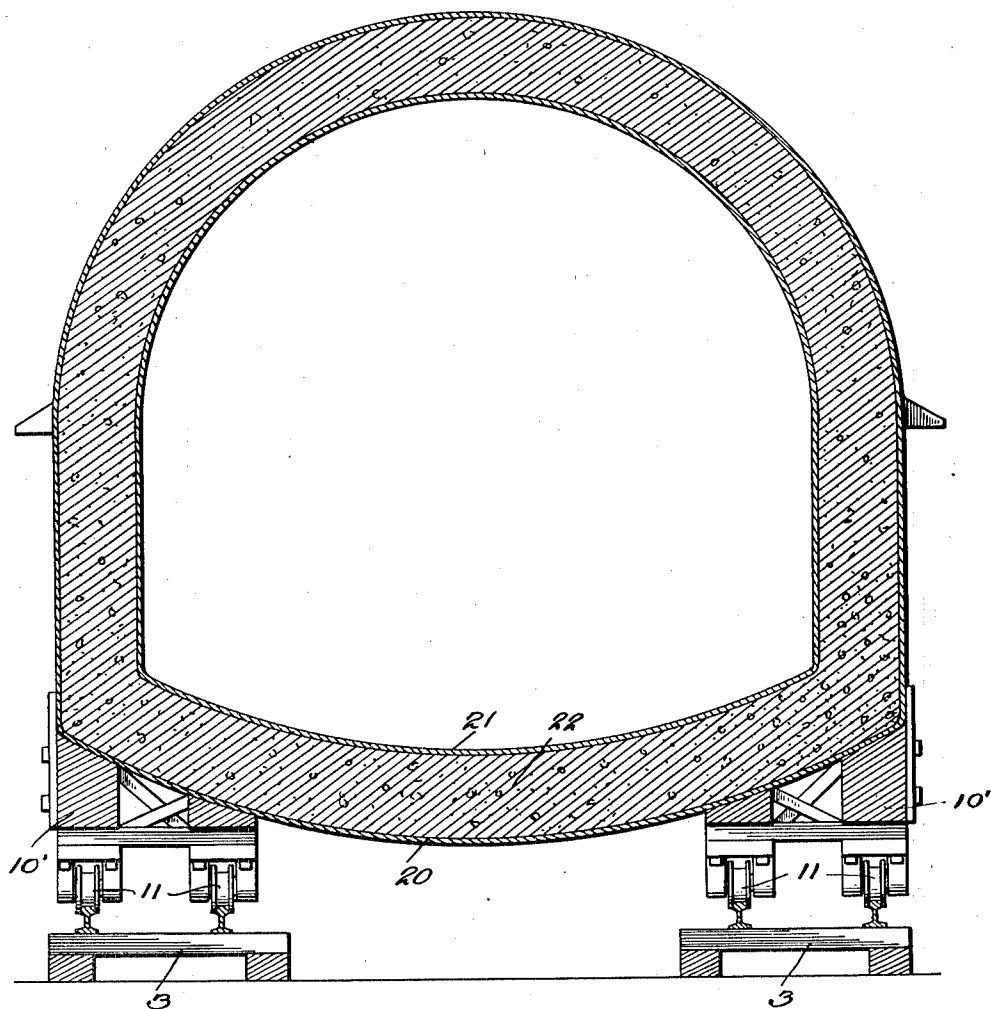
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METHOD OF CONSTRUCTING AND INSTALLING SUBAQUEOUS CONDUITS

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3 Sheets-Sheet 3

Trị 4.



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UNITED STATES PATENT OFFICE.

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METHOD OF CONSTRUCTING AND INSTALLING SUBAQUEOUS CONDUITS.

Application filed September 30, 1926. Serial No. 138,772.

The invention relates to a novel method of constructing and installing subaqueous conduits, such as pipe lines, tunnels and the like, which comprises laying a track on the bed of the waterway on the site to be occupied by the conduit, said trackway preferably extending upon at least one shore of the waterway, forming the conduit on shore and drawing the formed conduit over said track to the ultimate submerged position of said conduit on the bed of the waterway, and extending either from shore to shore or from one shore to the terminus of the conduit.

Various modes of applying the invention are illustrated in the accompanying drawings, in which:—

Fig. 1 is a schematic cross section of a river bed, with a relatively large pipe line being installed therein.

Fig. 2 is a vertical cross section of a large conduit in the form of a tunnel associated with trucks by means of which the tunnel is moved into place on the bottom of the waterway.

Fig. 3 is a side elevation of the structure shown in Fig. 2, illustrating a short section of the formed tunnel.

Fig. 4 is a view similar to Fig 2 showing a modified mode of mounting the tunnel or conduit on its supporting trucks.

Fig. 5 is a sectional elevation of a modified form of trackway and supporting means for a pipe line thereon.

Fig. 6 is a sectional elevation through a trench or excavation in the bottom of a waterway, a track in said trench and a pipe line directly engaging the track over which the formed pipe line is drawn.

The construction of subaqueous conduits, such as relatively large pipe lines, traffic tunnels and the like, as heretofore practiced, has involved large elements of time, labor and expense, because of the uniform practice of building or assembling the sections of the conduit, whether the same be a pipe line or a tunnel in situ on or below the river bed or other subaqueous location. The instant invention is designed to largely conserve said elements by first forming the conduit on shore and then drawing the formed conduit over a prepared track installed on the bottom of the waterway on the site to be occupied by the conduit, to the ultimate submerged position of said conduit.

In carrying out the invention, the bottom of the waterway, constituting the site for the submerged conduit, is prepared to receive a track or railway. In case the bottom of the waterway is irregular in surface contour, the site of the trackway is excavated or dredged to form a substantially uniform track bed, sloping gradually from the shores, as illustrated generally in Fig. 1 of the drawings, the necessary precautions being taken to provide a firm supporting bed for the track, which, in the case of the construction and installation of relatively large conduits, such as traffic tunnels or the like, is preferably formed of two spaced double track sections 3, 3, as indicated in Figs. 2, 3 and 4, the two sets of rails being spaced at proper intervals to either lie outside or laterally of the conduit, as shown in Figs. 2 and 3, or beneath the lateral sections of the conduit, as shown in Fig. 4. Preferably the trackway is continued on shore over the bank of one side of the waterway to constitute a foundation upon which to assemble or build up the conduit, which latter is preferably constructed as a whole, or, in the alternative, in two half sections, before it is placed in its submerged position in the waterway.

When the conduit constitutes a tunnel or built up structure of relatively large dimensions, such as illustrated in Figs. 2 and 3, the fabricated sections of the outer shell 20 are assembled and supported on the shore end of the trackway on special forms of trucks comprising built up body portions 10 provided with traction wheels 11 engaging the two sets of rails of the trackway 3, each truck being provided with an adjustable tie rod 12 having a stirrup 14 at its lower end to support the ends of a cross beam 15, upon which the shell of the conduit rests, the adjustable element of the supporting rods 12 preferably being formed as a turn buckle 13, which provides for the accurate leveling of the supporting cross beam 15. The shell of the conduit is anchored to the cross beams by adjustable tie rods 16 engaging lugs 17 on the opposite sides of the shell and also engaging the supporting cross beam 15, by means of stirrups similar to those on the ends of the supporting rods or hangers 12. A sufficient number of trucks is provided to support the entire constructed or assembled conduit on the shore section of the trackway,

and, as the conduit is rigidly attached to each of the cross beams 15, when the entire conduit has been constructed or assembled, it will constitute a relatively rigid wheeled structure capable of being moved bodily over the trackway to its ultimate submerged position on the bottom of the waterway. In the event that the entire conduit structure is fabricated and assembled on the rail supported trucks, the respective shore ends of the conduit will be formed with the proper inclination to conform to the sloping sections of the trackway, or the bottom of the excavated trench in the banks of the waterway.

Should it be found necessary or expedient to construct the conduit in two sections, to be ultimately connected at or about the middle of the waterway, these sections may be formed or fabricated either on the opposite banks of the waterway on the tracks and trucks, as hereinbefore explained, or, if desired, both sections may be constructed on one bank and then separately advanced as units to their ultimate positions over the trackway and the abutting ends at the middle of the waterway united by any suitable form of jointure. In moving the fabricated conduit to its ultimate submerged position, a wire cable, such as 30, see Fig. 1, is passed through the conduit and anchored, as at 31, to one end of the conduit, the cable 30 being coupled to a suitable winding apparatus, such as the drum 32 of a winch or hoisting engine 34, located on the bank of the waterway opposite to that on which the conduit was assembled. When the cable 30 is taken up by the drum 32, the conduit as a whole will be advanced over the rails of the trackway, by the wheeled trucks which engage the latter, until the conduit reaches its ultimate position, extending from shore to shore of the waterway, or, in case the conduit is formed in two separate sections, until each section extends from one shore to the middle of the waterway where the abutting ends of the conduit may be readily connected by a suitable joint formed by a diver or submarine workman. After the conduit has been moved to its ultimate position, it is lowered to its prepared bed in the bottom of the waterway by releasing the beams 15 from the supporting rods or hangers 12 on each of the trucks and withdrawing the beams, thereby permitting the conduit to settle a relatively short distance, as represented by the height of the cross beams 15 from the prepared bed of the conduit, or, in the alternative, the supporting beams 15 may be lowered until they rest upon the rails of the trackway 3 and left in position to constitute permanent cross supports for the conduit, which remains locked to the beams 15 by the tie rods 16.

If the conduit is of a very large size, such as required to accommodate railway or ve-

hicular traffic, the outer shell 20 is constructed and moved to its ultimate position on the bed of the river or other waterway, in the manner hereinbefore explained, after which the inner shell 21 may be similarly constructed and applied by laying a temporary trackway inside the shell for the entire length of the latter and extending on shore for a distance sufficient to constitute a support for trucks upon which the inner shell 21 is similarly assembled and constructed as in the case of the outer shell, the finished inner being then rolled into position within the outer shell on the wheeled trucks, and, when in position, the inner shell is blocked up to permit the trucks to be removed, after which the space between the inner and outer shells is filled with concrete or similar material, as at 22.

Instead of supporting the tunnel or conduit between laterally spaced trucks, as indicated in Figs. 2 and 3, the conduit may be built up and supported directly upon spaced pairs of trucks, as shown in Fig. 4, in which 3, 3 are the two sections of the trackway and 10' the trucks mounted upon wheels 11 engaging the rails of the trackway, the tops of each truck being constructed to conform to the bottom contour of the conduit, and in such case the trackway and trucks may be left in position as supports for the conduit, after the latter has been drawn to its ultimate position on the bottom of the waterway.

In constructing and installing pipe lines or mains up to say six or eight feet in diameter, a simple form of apparatus may be employed, two types of the latter being shown in Figs. 5 and 6, respectively.

In Fig. 5, a relatively simple form of two rail track 3" is laid on the prepared site or bottom of the excavated trench, traversing the waterway, in which the conduit is to be laid, the rails of the track being connected by metal straps engaging the bases, and the submerged trackway being connected with a regular track on one shore of the waterway, upon which the pipe line or conduit is assembled either as an entirety or in two or more assembled sections or units. Instead of constructing separate trucks upon which the pipe line is assembled, certain of the pipe sections are provided with rollers engaging the track in the manner illustrated in said Fig. 5, in which 25 is a split ring adapted to be firmly clamped to the exterior of the pipe by a bolt 26, the ring having thereon pairs of projecting ears 27 in which rollers 28 are journaled, the rollers being inclined to the horizontal, so that the axes thereof would meet in the center of the trackway, whereby the rollers would engage the lateral edges of the rail heads and serve to guide and center the pipe line in axial alignment with the railway. In this case, the sub-

merged portion of the railway is left in position on the bed of the waterway and serves as a permanent support for the pipe line.

In the modification shown in Fig. 6, the same type of submerged trackway is provided and is permanently positioned on the bottom of the excavated trench formed in the bottom of the waterway and the pipe line, the diameter of which is greater than the gauge of the trackway, engages the rails at the flanges of the pipe sections, so that the pipe line will be held in accurate alignment in respect of the trackway, as the pipe line is drawn into position in the bed of the excavation, in the manner hereinbefore indicated.

One especial advantage of this mode of constructing and applying submerged conduits is that the work may be carried on without interfering with navigation of the waterway, as all of the work of erecting the conduit is performed on shore and the conduit either as a whole or as permissibly large unitary sections is or are drawn along a trackway located on or at the ultimate site of the submerged conduit on the river bed or in a trench dredged therefrom.

What I claim is:

1. The method of constructing and installing subaqueous conduits, which comprises laying a track on the bottom of the waterway, forming the conduit with attached wheeled supporting trucks on shore, and drawing the formed conduit on said trucks over said track to the ultimate submerged position of said conduit.

2. The method of constructing and installing subaqueous conduits, which comprises

laying a track on the shore and bottom of the waterway, forming the conduit with attached wheeled supporting trucks on the shore section of the track, and drawing the formed conduit on said trucks over said track to the ultimate submerged position of said conduit.

3. The method of constructing and installing subaqueous conduits, which comprises excavating a track bed in the bottom of a waterway on the site of the conduit, laying a track on said bed, forming the conduit with attached wheel supporting trucks on shore, and drawing the formed conduit on said trucks over said track to the ultimate submerged position of said conduit.

4. The method of constructing and installing subaqueous conduits, which comprises excavating a track bed in the bottom of the waterway on the site of the conduit, laying a track on the shore and on the excavated track bed, forming the conduit with attached wheeled supporting trucks on the shore section of the track, and drawing the formed conduit on said trucks over said track to the ultimate submerged position of said conduit.

5. The method of constructing and installing subaqueous conduits, which comprises excavating a track bed in the bottom of the waterway on the site of the conduit, laying a track on the shore and on the excavated track bed, forming the conduit on trucks on the shore section of the track, and drawing the formed conduit on said truck over said track to the ultimate submerged position of said conduit.

In testimony whereof I affix my signature.
WILLIAM F. JONES.