Jan. 15, 1957 J. M. ROSA ET AL 2,777,294

METHOD OF LAYING PIPE

Filed May 11, 1954

Fig. 1

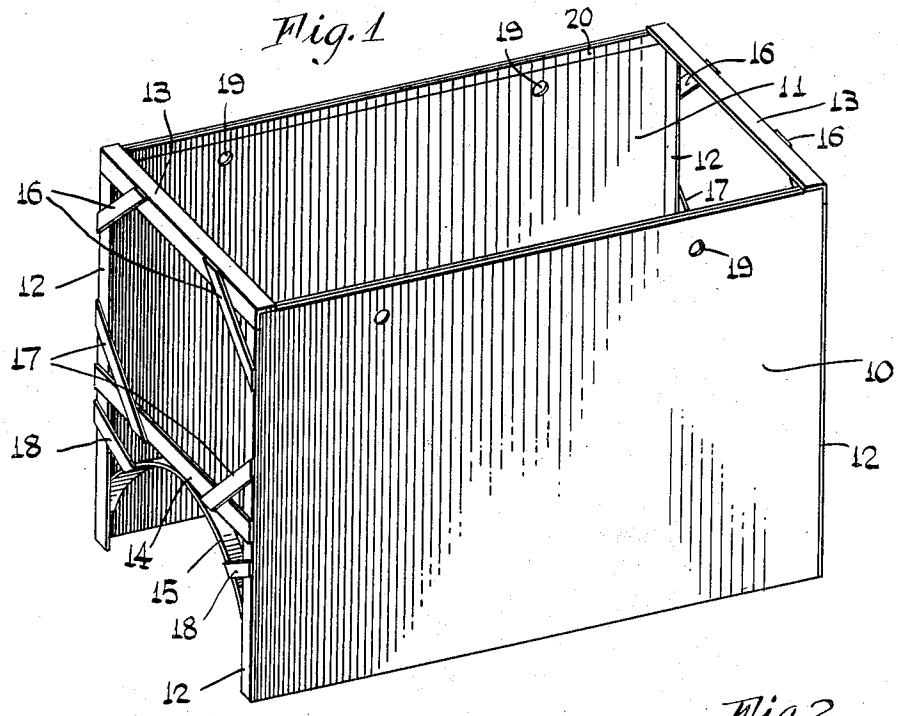


Fig. 3

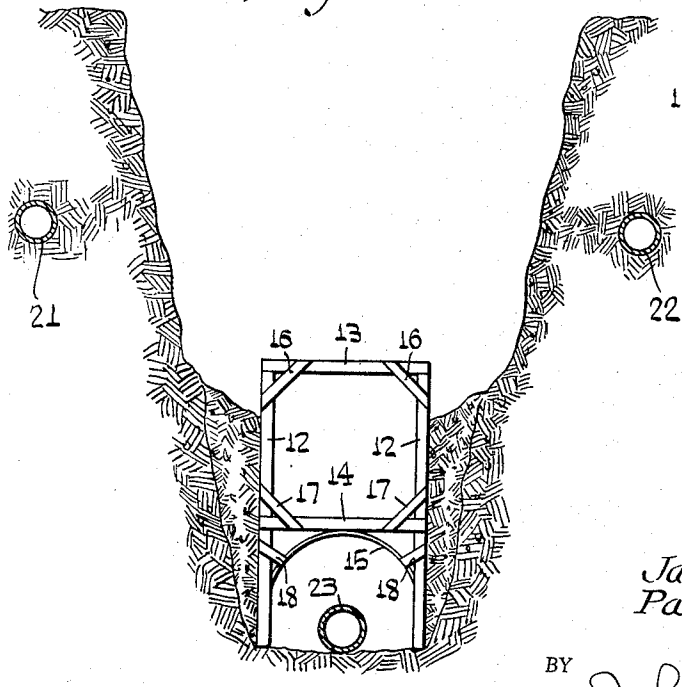
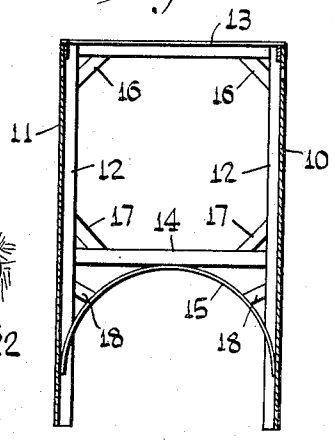


Fig. 2



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2,777,294

Patented Jan. 15, 1957

2,777,294

METHOD OF LAYING PIPE

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Application May 11, 1954, Serial No. 428,882

4 Claims. (Cl. 61—41)

This invention relates to a method and means for simplifying the laying of pipe in a trench formed in wet, loose soil, and particularly to the laying of pipe below the ground water level in such a trench.

In laying pipe, particularly sewer pipe, deep cuts are encountered because the gravity system is used in most cases. In digging such deep cuts, it is usually necessary to dig below the ground water level and water becomes a problem, particularly if the soil is sandy or loose since the water action undermines the adjacent soil. This is particularly serious when the trench is in the location in which water pipes and gas mains are installed in the adjacent ground since the undermining tends to weaken the support for the mains with resulting damage thereto.

Heretofore, under these conditions, wood sheathing has been placed and driven below the grade and the trench dug within the wood sheathing. This is a costly construction since the cost of lumber is high and the labor involved in placing and driving the lumber is substantial.

The present invention overcomes these difficulties by providing a novel method and apparatus whereby wood sheathing can be eliminated and the sides of the trench prevented from being acted upon by the water to undermine the support for adjacent water and gas mains.

This is accomplished, according to the present invention, by providing a box frame unit of steel which is adapted to be inserted into the trench, preferably at the time the water level is reached and to be driven into place to support the sides of the trench while the dirt within the unit is removed until the grade level is reached. Preferably, the sides of the trench adjacent the unit are backfilled so as to provide adequate lateral support for the soil under the adjacent mains.

In accordance with the present invention, a plurality of box units may be driven into the trench in end-to-end relation and a pump at either end of the plurality can readily keep the trench free from water and at the same time the box units will prevent the water from undermining the sides. After the pipe has been laid, in accordance with the present invention the trench is filled to the top of the box unit with soil. Suitable hooks or cables are then connected to the units and they are withdrawn. However, inasmuch as the trench is filled with soil prior to the withdrawal of the box, displacement of the adjacent ground is prevented.

The box units can be easily handled and placed in position by means of cranes or the like and can be readily driven into position. They are preferably provided with a broad driving edge at their top and a relatively sharper cutting edge at the bottom so that they can be driven easily into position. The units are of relatively light weight since they have skeleton end construction and an open top and bottom so that they can be readily and easily handled with a minimum of labor and since they can be re-used the cost for protecting a particular area of trench can be greatly reduced over that heretofore used when wood siding was inserted.

While the invention is particularly useful in working below ground water level, it is also useful in working in trenches where the soil condition is such that cave-ins and slides in the side wall are frequent, such as in sandy soil and loose soil, particularly after rains. The sides of the unit not only prevent the walls from caving in but also form a protection for the worker during the installation of the pipe.

Other features and advantages of the invention will be apparent from the specification and claims when considered in connection with the drawings in which:

Figure 1 shows a perspective of the unit.

Fig. 2 shows an end view of the unit.

Fig. 3 shows an end view of the unit in place in a trench showing the relation of the water main and gas mains.

As shown in the drawings the unit comprises side plates 10 and 11 and have inwardly inclined flanges 12 at the ends thereof. While the flanges may be formed integrally with the side walls, it is at present preferred to form them by means of angle irons secured to the ends of the side plates by welding or the like to project inwardly as shown in Fig. 1. The box unit has an open top and bottom and skeleton ends. The skeleton ends are each formed by means of angle irons 13 secured to the flanges 12 and top of the side plates and a transverse strap 14 intermediate the ends of flanges 12 and secured thereto. If desired, a curved plate 15 can be connected adjacent the bottom of the side plates to extend transversely between them and secured to the strap 14 as shown in Figs. 1 and 2. This curved plate 15 provides support adjacent the bottom of the side plates and yet permits installation of the pipe without interference by the skeleton wall.

In the preferred form of the invention the transverse angle irons 13, strap 14 and plate 15 are braced by reenforcing braces 16, 17 and 18 secured to the flanges and to the transverse angle irons, strap and curved plates at points inwardly spaced from the side plates so as to provide for a strong tie-in to produce a rigid unit. While the unit may be of any desirable size, it is at present preferred to make the side plates substantially six feet high and ten feet long, with the spacing between the plates depending upon the size pipe to be laid. Excellent results have been achieved with a spacing of three and one-half feet.

As shown in the drawings, the side plates are provided with apertures 19 for receiving lifting means which may be hooks or cables or the like whereby the unit may be readily moved into place in the trench to be driven into supporting position and may be withdrawn from the trench when it is desired to remove the unit.

As shown in Fig. 1, the top is provided with a broad edge formed by a short plate 20 secured to the inner surface of the side plates, thus providing a driving edge for the unit. The bottom of the unit is of single plate thickness and will readily pierce the earth.

The present invention includes the novel method of laying the pipe in which the unit is employed. When it is desired to lay pipe, particularly in sandy soil, the trench is dug to the ground water level. The box units are then moved into position in the trench and are driven into the trench, preferably by laying a timber or the like across the top of the unit and dropping a clamshell bucket or the like on it to drive it into position. As it is being driven to the grade level, the dirt within the box is scooped out and the sides of the trench outside of the unit backfilled to provide adequate lateral support for the adjacent ground under the water main 21 and gas main 22. One or more units may be located in end-to-end relation and driven in so as to provide an elongate protected trench. When the grade level is reached, pumps at each end of the succession

of units keep the water out of the unit while the pipe is laid. As soon as the pipe **23** is laid, the trench is filled to the top of the box unit whereupon cables or hooks are inserted in the holes **19** and the units removed. This will probably be best understood from a specific example where the cut required was a sixteen foot cut with seven feet of water in fine sand. The trench was dug for about ten feet from the surface of the street. The boxes were then set in the excavated trench in a series, assuming six boxes were used, so that sixty feet of trench was provided in which to lay the pipe. The boxes were driven partially into the ground and the dirt removed from within the box by a clamshell bucket and while the digging progressed, the boxes were driven deeper into the ground until substantially the grade of excavation of the boxes was achieved. A pump at each end of the sixty foot trench kept the trench dry until the pipe **23** was laid. The trench was then backfilled to the top of the boxes and when they were pulled out, the fill prevented any movement of adjacent earth so that there was no chance for the water mains or gas mains to be undermined.

By this method elimination of wood sheathing is completely achieved with its attendant cost of material and labor and time involved so that greater speed can be accomplished with less waste of material and labor.

In some circumstances where water is not encountered but loose sand and gravel are present, it may be desired to drive the boxes into position and to backfill them, as shown in Fig. 3, to prevent shifting of the sides of the trench during the laying of the pipe. Here again, the trench is filled to the top of the box and the box withdrawn, preventing undue shifting of the side walls and the support of the adjacent ground for mains located therein. This eliminates the need for wood bracing which is costly and does not provide the protection to the men in the trench as is achieved by the use of the box units of the present invention.

Variations and modifications may be made within the scope of the claims and portions of the improvements may be used without others.

We claim:

1. The method of laying pipe in wet loose soil comprising the steps of digging a trench until the wet loose soil is encountered, driving a box unit having an open top and bottom into the trench to the grade level to support the loose soil in the sides of the trench as the trench is dug through the loose soil to the grade level, backfilling the trench on either side of the unit to provide adequate lateral support for the ground on either side of the trench, laying the pipe at grade level, filling the box unit with soil after the pipe is laid, and withdrawing the box unit from the trench and leaving the filling in place so as to prevent displacement of the side walls of the trench as a result of removal of the unit.

2. The method of laying pipe in wet loose soil without weakening the support for adjacent installed pipe, comprising the steps of digging a trench until the wet loose soil is encountered, driving a box frame having an open top and bottom into the trench until the bottom reaches the grade level to prevent undermining of the sides of the trench by the loose soil as the soil is removed from within the box to grade level, backfilling the trench on either side of the frame to provide adequate lateral support for the sides of the trench, laying the pipe at grade level, filling the box with soil after the pipe is laid, and withdrawing the box frame from the trench, leaving the filling in place so as to prevent displacement of the side walls of the trench and weakening of the support for adjacent installed pipe.

3. The method of laying pipe below the ground water level in loose soil without weakening the support for adjacent installed pipe, comprising the steps of digging a trench until the ground water level is reached, driving a metal box frame unit having an open top and bottom into the trench until the bottom of the box reaches the grade level to provide adequate lateral support for the ground on either side of the trench, removing the soil from within the box to grade level with the sides of the box preventing the water from washing out the loose soil to undermine the support for the adjacent pipe, pumping the water from the box, laying the pipe at grade level, filling the box unit with soil after the pipe is laid, and withdrawing the box frame unit from the trench and leaving the filling in place so as to prevent displacement of the side walls of the trench and weakening of the support for adjacent installed pipe as a result of the withdrawal of the box unit.

4. The method of laying pipe below the ground water level in loose soil without weakening the support for adjacent installed pipe, comprising the steps of digging a trench until the ground water level is reached, driving a plurality of metal box frame units having an open top and bottom into the trench in end-to-end relation until the bottom of the box reaches the grade level to provide adequate lateral support for the ground on either side of the trench, removing the soil from within the box units to grade level with the sides of the box units preventing the water from washing out the loose soil to undermine the support for the adjacent pipe, pumping the water from the box units, laying the pipe at grade level, filling the box units with soil after the pipe is laid, and withdrawing the box frame units from the trench and leaving the filling in place so as to prevent displacement of the side walls of the trench and weakening of the support for adjacent installed pipe as a result of the withdrawal of the box units.

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