

[54] **SHORING APPARATUS**

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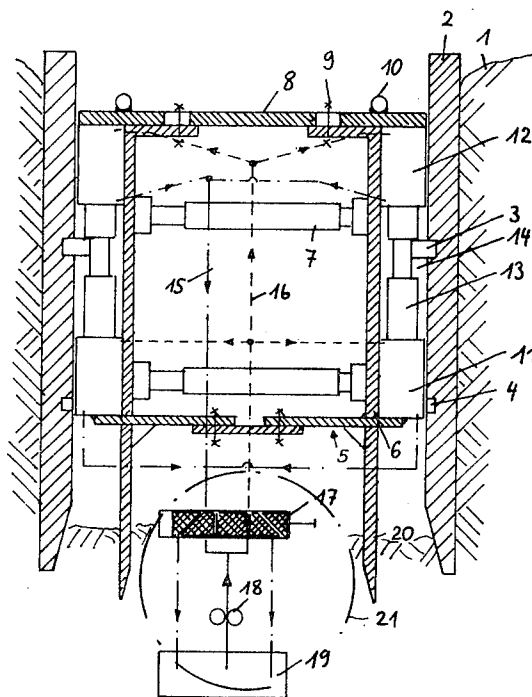
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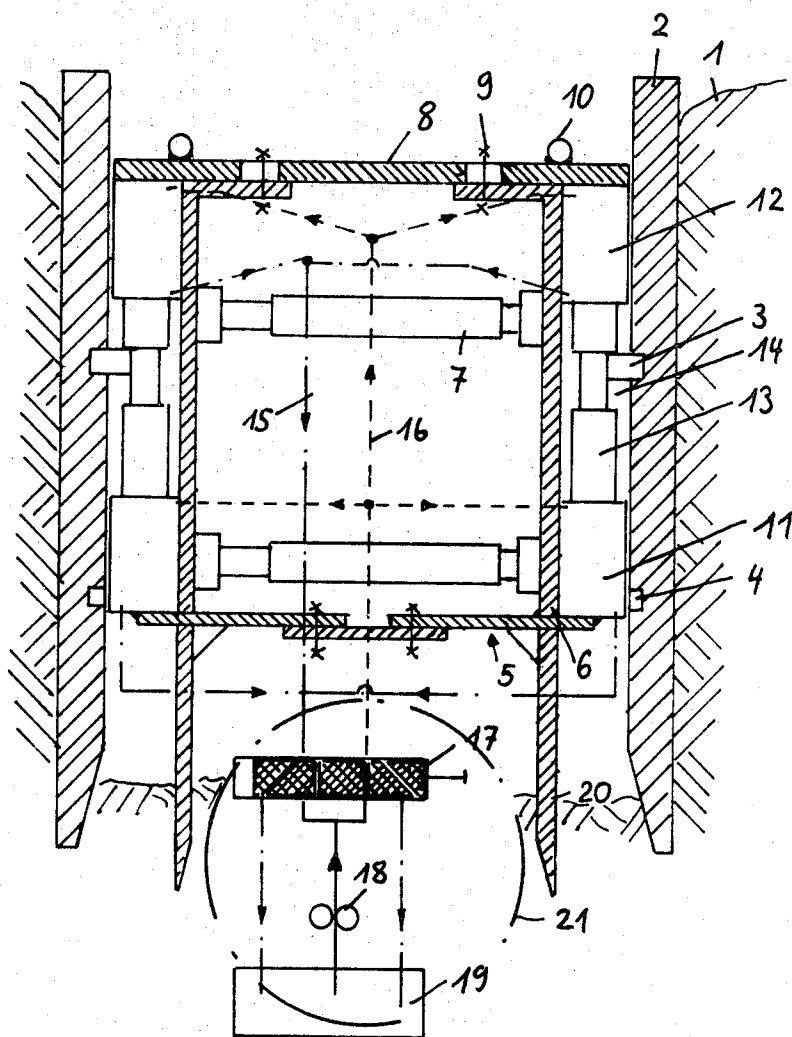
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[57] **ABSTRACT**

Apparatus for shoring the walls of trenches or ditches including fluid motors carried by a framework and being adapted to cooperate with sheet members for forcing the sheet members into place to support the trench walls and for removing the sheet members after work has been completed.

4 Claims, 1 Drawing Figure





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SHORING APPARATUS

The invention relates to shoring apparatus for forcing sheeting elements into position for shoring the walls of trenches or ditches and for removing the same therefrom.

The present invention provides an apparatus for shoring walls of a trench with sheeting elements, said apparatus including a frame having a pair of spaced frame members, extensible spacing means for holding said frame members in spaced apart relation, fluid motor means carried by said frame outwardly of said spaced frame members, said fluid motor means including a pair of spaced pistons disposed within spaced cylinders and connected together by a piston rod, valve means for connecting opposite ends of said cylinders to a source of fluid pressure, and means for connecting said piston rod to said sheeting elements.

The invention also provides apparatus including a cover plate, and means for adjustably connecting said cover plate to said frame members.

Further, the invention includes lifting ring means fixed to the cover plate on its uppermost side.

In addition, the invention includes leg means extending downwardly from said spaced frame members below said fluid motor means.

For insertion of sheet walls consisting of sheeting elements, it is known to use pile-driving apparatus.

Insofar as such apparatus is not available, the shovel of an excavator is used in order to continue to force down the sheeting elements into the soil by shock loading.

In the case of trenches or ditches which are first dug by an excavator, the sheet walls do not require too great depth of penetration to be anchored firmly in the soil at the bottom of the ditch.

In the case of processes customary heretofore, the possibility exists that the relatively thin sheet walls will be damaged by the effects the pile driving action. Since these walls are to be used several times, damage to the walls therefore is undesirable.

A further problem in the prior art results especially during withdrawal of the sheet wall. Heretofore, the sheeting members, which in most instances are driven in perpendicularly, are pulled out individually. For sheeting elements which are placed horizontally, the usual practice is to first pull out all supporting posts, but such practice causes the sheeting elements to lose their support and fall into the trench. At the same time, it can happen that pipes or similar objects already laid will be damaged and/or the trench collapses. Further, it is troublesome to remove the sheeting elements individually from the trench.

The principal object of the present invention is the creation of a construction unit which will avoid the above-mentioned disadvantages and which particularly will make possible the simple removal of the entire walls formed of sheeting elements.

It will be seen that the invention contemplates that sheeting elements are provided with cams or projections extending in the direction of the inside of the trench and that, furthermore a frame has been provided which has spaced frame members spaced apart by at least two spacing devices which consist of pipes which can be moved apart like a telescope. Located on the outside of the frame members are fluid motors which, preferably, are comprised of upper and lower double-acting hydraulic cylinders each having a piston disposed therein with the pistons being interconnected with one another by a common piston rod. A shoulder or a recess is provided in the piston rod which cooperates with cams or projections from the sheeting elements so that, when the fluid motors are connected to a source of fluid pressure and a reversing valve, the pistons are acted upon by fluid pressure for placing the sheeting elements in, or removing them from, supporting relation with the wall of a trench or ditch.

In operation, the frame is placed into the trench in such a way that the piston rod is in positive connection with the protruding cams of the sheeting elements. The fluid pressure is

then introduced into the cylinders to force the sheeting elements down into the soil, or pulled out from it. After the sheeting elements have been loosened, they may be pulled completely free of the trench by means of an excavator or a type of lifting means. In this case, it has been found to be advantageous to cover the frame members with a cover plate which is removably and adjustably connected thereto. The cover plate preferably has lifting rings fixed thereto to provide a connection means for attachment to the chain or cable of an excavator.

Another feature of the invention is that the frame members may have elongated legs extending downwardly below the fluid motors so that the entire frame may straddle or otherwise be disposed above pipes or equipment located at the bottom of the trench.

With the above and other objects in view that will hereinafter appear, the nature of the invention will be more clearly understood by reference to the following detailed description, the appended claimed subject matter and the view illustrated in the accompanying drawing.

The FIGURE in the drawing is a vertical, elevational view, partly in section, and shows the shoring apparatus and sheeting elements in position for supporting walls of a trench.

The drawing shows a preferred embodiment wherein the walls of a trench or ditch 1 are supported against collapse by sheeting elements 2. The sheeting elements 2 are provided with removable cams or projection members 3 which extend inwardly from the side walls and are locatable within selected ones of a plurality of recesses 4.

The cross section of trench 1 is filled by a frame 5 which consists of a pair of spaced frame members 6 comprised of metal sheets which are connected with one another by at least two spacing devices 7. The spacing devices 7 consist of pipes that can be extended in the manner of a telescope and may be operated mechanically or hydraulically. Furthermore, the frame members 6 are connected with one another by means of a cover plate 8 which is provided with elongated holes or slots, for adjustably receiving therein screws, or bolts, etc., which extend through the cover plate 8 and connect with bracket arms fixedly secured to the vertically disposed frame members 6. Preferably, a pair of spaced suspension rings or lifting rings 10 are secured, such as by welding, to the top of cover plate 8 so that frame 5 can be easily attached to a chain or cable connected with an excavator or other type of lifting means.

Outwardly of the frame 5, and adjacent to the sheeting elements 2, are provided a pair of spaced fluid motors each comprised of vertically arranged hydraulic lift cylinders 11 and 12 whose pistons are connected with each other by a common piston rod 13. The piston rod 13 has a gradation, or shoulder, or other connection means 14 located adjacent to the cams or projections 3 for cooperation with each other.

Cylinders 11 and 12 have been provided on opposite sides of the respective piston with feed or discharge pipes 15 and 16 which comprise fluid conduit for directing fluid under pressure out to and from cylinders 11 and 12. Fluid lines 15 and 16 are shown as being connected through an operable slide valve 17 with a pump 18 and a fluid reservoir 19.

During operation, the frame 5 is inserted perpendicularly between the already inserted sheeting elements 2 in such a way that cams 3 will engage with shoulder or recess 14 of piston rod 13. At the same time, the shovel of the excavator (not shown) rests upon cover plate 8, this being necessary to provide a reaction member for proper operation of the device.

Through proper introduction of pressure fluid into the cylinder space of cylinder 12 on the side of the piston, and into the cylinder space of cylinder 11 on the side of the piston rod, sheeting elements 2 are pressed downwardly in the direction of the bottom of trench 1. Since cover plate 8 is narrower than the inside width of trench 1, the frame 5 can be inserted at any desired height.

It is apparent that in order to pull the sheeting elements 2 out from their operative positions, the slide valve 17 is moved so that pressure fluid flows in the reverse manner. In that case,

cylinders 11 are acted upon by the fluid on the side of the piston, while the fluid acts in cylinders 12 on the side of the piston rods. While frame 5 again is supported in this instance by the shovel of the excavator resting on cover plate 8, the sheeting elements 2 are pulled out of the soil and can then be pulled without damage from trench 1 together with frame 5 suspended on the excavator. In this manner, the entire sheeting elements 2 can be pulled out without their individual parts dropping inside the trench and without the need to remove them individually.

It will be apparent that frame 5 can be adjusted to conform to trenches of different widths by making appropriate adjustment to the spacing devices 7.

In some instances, it is preferred that frame members 6 are prolonged downwardly by providing extensions or legs 20 at opposite sides of frame 5. Thus, it is possible to press the soil down on lateral sides of pipes 21 which are laid in the trench 1. Further, legs 20 also provide suitable support for erecting frame 5 outside of the trench or ditch.

While preferred forms and arrangement of parts have been shown in illustrating the invention, it is to be clearly understood that various changes in details and arrangement of

parts may be made without departing from the scope of the invention, as defined in the appended claim subject matter.

I claim:

1. Apparatus for shoring walls of a trench with sheeting elements, said apparatus including a frame having a pair of spaced frame members, extensible spacing means for holding said frame members in spaced apart relation, fluid motor means carried by said frame outwardly of said spaced frame members, said fluid motor means including a pair of spaced pistons disposed within spaced cylinders and connected together by a piston rod, valve means for connecting opposite ends of said cylinders to a source of fluid pressure, and means for connecting said piston rod to said sheeting elements.

2. Apparatus as defined in claim 1 including a cover plate, and means for adjustably connecting said cover plate to said frame members.

3. Apparatus as defined in claim 2 including lifting ring means fixed to said cover plate on its uppermost side.

4. Apparatus as defined in claim 1 including leg means extending downwardly from said spaced frame members below said fluid motor means.

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