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EXCAVATION SHORING DEVICES

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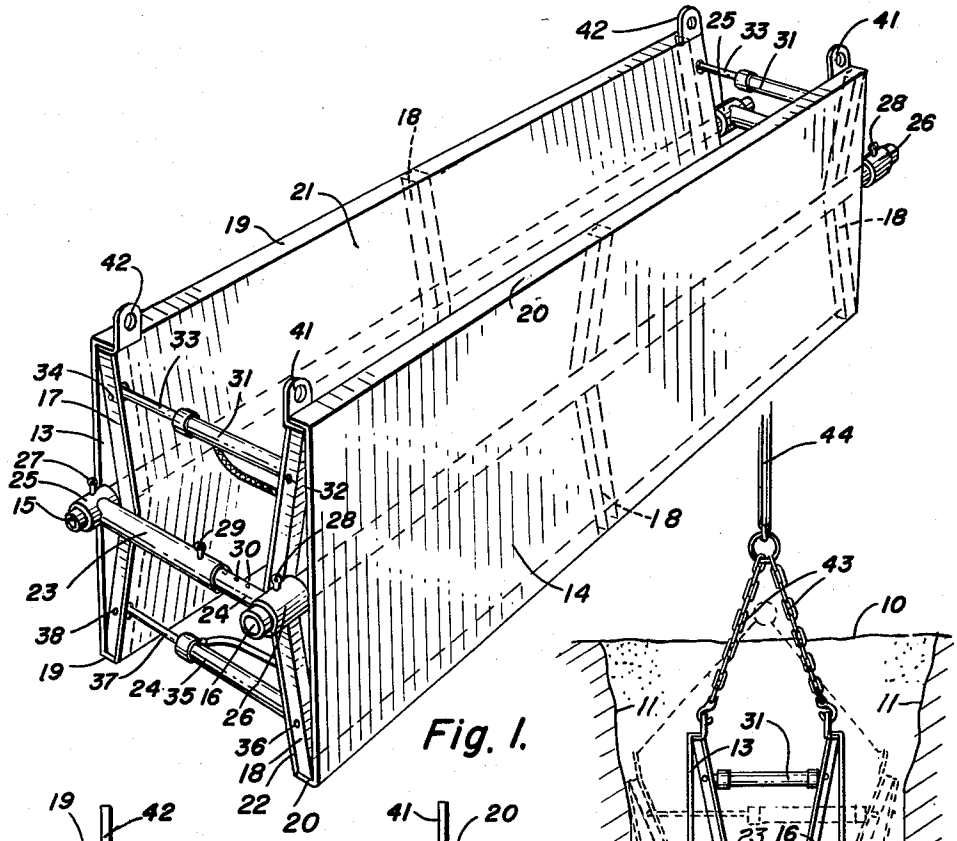


Fig. 1.

Fig. 3.

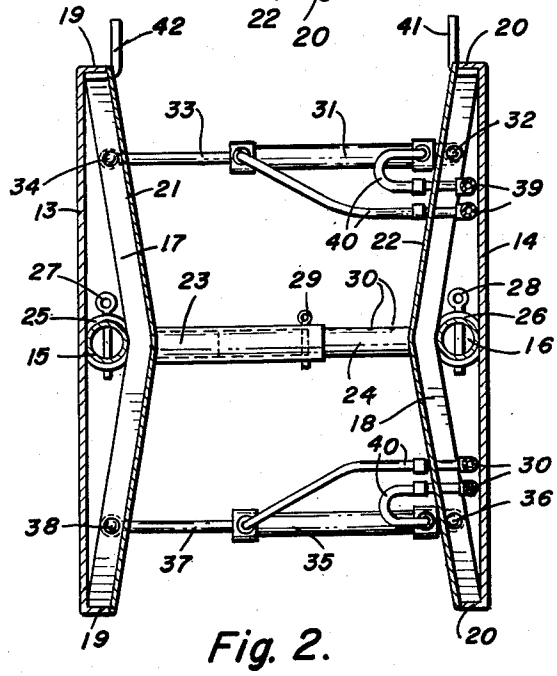


Fig. 2.

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EXCAVATION SHORING DEVICES

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1 Claim. (Cl. 61—41)

This invention relates to a shoring device or unit for pipe line excavations and has for its principal object the provision of a shoring unit which can be hydraulically expanded and contracted to accommodate excavations of varying width; to provide a unit in which the sides may be hydraulically rocked and tilted to loosen the unit from the side walls of the excavation so that it may be quickly and easily withdrawn; and to so construct the shoring unit that a plurality of units may be superimposed upon each other to accommodate exceedingly deep excavations.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a perspective view of the improved shoring unit in a partially expanded condition;

Fig. 2 is an enlarged cross-section therethrough; and

Fig. 3 illustrates the unit as it would appear lifted from place in an excavation.

In Fig. 3, the side walls of an excavation are indicated at **11**, the bottom thereof at **12**, and the ground line at **10**.

The improved shoring unit comprises two similar horizontally-elongated sheet metal side plates **13** and **14**. A horizontal reinforcing tube **15** is welded to, and extends longitudinally of, the side plate **13**. A similar reinforcing tube **16** is similarly welded to, and extends longitudinally of, the side plate **14**. The reinforcing tubes **15** and **16** are positioned medially of the side plates and project at their extremities oppositely outward beyond the end of the plates. A plurality of vertical stiffening braces **17** are horizontally spaced along the side plate **13** and a plurality of similar vertical stiffening braces **18** are horizontally spaced along the side plate **14**. The stiffening braces may be of any desired cross-section but are preferably formed from hollow square metal tubing bent in a flat V-shape so that they will cross the reinforcing tubes **15** and **16** on the inside of the latter and extend outwardly at their extremities to the planes of the side plates. The stiffening braces are welded to the reinforcing tubes and to the side plates.

The upper and lower edges of the side plate **13** are turned inwardly over the extremities of the stiffening braces **17** to form top and bottom flanges **19**. The upper and lower edges of the plate **14** are similarly turned inwardly to form top and bottom flanges **20**. A medially-bent protecting plate **22** extends between the flanges **20** and over the surface of the stiffening braces **18**.

The structural elements **13, 15, 17, 19** and **21** are all rigidly welded together to form a complete first side

wall member of the improved shoring device and the members **14, 16, 18, 20** and **22** are similarly rigidly welded together to form a complete second side wall member of the improved shoring device. The two side members are adjustably connected together at their extremities by means of extensible cross members. Each cross member comprises an outer telescoping tube **23** into which an inner telescoping tube **24** is slidably fitted. Each outer tube **23** projects from a first tube sleeve **25** and each of the inner tubes **24** projects from a similar second tube sleeve **26**. The first tube sleeves **25** are movably fitted over the projecting extremities of the reinforcing tube **15** and each sleeve can be locked against rotation on the tube **15** by means of a first locking pin **27** which can be inserted through the sleeve **25** and the tube **15**. Each of the second sleeves **26** is similarly movably fitted over the projecting extremities of the reinforcing tube **16** and each can be locked against rotation thereon by means of a second locking pin **28**. Each inner tube **24** can be locked at any desired longitudinal position in its surrounding outer tube **23** by means of a third locking pin **29** arranged to extend through any desired pair of spaced series of pin holes **30** in the inner tubes **24**.

An upper hydraulic cylinder **31** is mounted on an upper hinge pin **32** in the upper extremity of the terminal stiffening brace **18** at each extremity of the side plate **14** and a hydraulic plunger **33** extends from each upper hydraulic cylinder **31** to an upper hinge pin **34** in the upper extremity of the terminal stiffening brace **17** of the opposite side plate **13**. A similar lower hydraulic cylinder **35** extends from a lower hinge pin **36** adjacent the lower extremity of each terminal stiffening brace **17** and a lower hydraulic plunger **37** extends from each lower hydraulic cylinder **35** to a lower hinge pin **38** adjacent the lower extremity of each terminal stiffening brace **17**.

The hydraulic cylinders and their plungers provide an upper and a lower hydraulically expansible device at each extremity of the shoring unit. The hydraulic cylinders **31** and **35** are of the double-acting variety and each is supplied with hydraulic fluid from fluid feed pipes **39** positioned between the plates **14** and **22** through the medium of suitable hydraulic hoses **40**. Hydraulic fluid is fed to the feed pipes **39** from any suitable adjacent hydraulic pump and hydraulic hoses (not shown) as is customary with hydraulically operated equipment.

A hanger member **41** extends upwardly from the inner edge and at each extremity of the upper flange **20** and a similar hanger member **42** extends upwardly from the inner edge of each extremity of the upper flange **19**. The hanger members **41** and **42** are adapted to receive hoisting chains **43** extending from any suitable hoist apparatus **44**.

In use, the complete unit is lowered into the excavation until the lower flanges **19** and **20** rest upon the excavation bottom **12**. The third locking pins **29** are then removed and hydraulic fluid is simultaneously introduced into all of the hydraulic cylinders **31** and **35** to force the two side members of the shoring device oppositely outward to bring the side plates **13** and **14** tightly against the side walls **11** of the excavation. If the excavation is to be continued downwardly, the entire device is allowed to descend as the bottom **12** is lowered and if necessary, a second shoring unit is positioned on top of the first unit so that it will be held in alignment therewith by the upstanding hanger members **41** and **42**.

The side plates can be hydraulically brought against the wall **11** with any desired pressure and when the desired separation has been reached, the third locking pins

29 are placed in position so that the use of the hydraulic fluid can be discontinued.

When the use for the excavation has been completed, all of the locking pins 27, 28 and 29 can be withdrawn to provide a completely flexible unit. Hydraulic fluid can then be alternately admitted to the upper cylinders 31 and the lower cylinders 35 to rock or tilt the side plates back and forth about the axes of the tubes 15 and 16 so as to loosen them from the side walls of the excavation. The device can then be hydraulically collapsed to the position of Fig. 3 and quickly lifted from the excavation.

Should an accidental cave-in occur which might bury the shoring device, all of the locking pins and pivot pins may be withdrawn to completely separate the side wall. Should the excavation cave or fill in at the bottom as indicated at 45 in Fig. 3, the shoring device can be narrowed at the bottom as shown in broken line in Fig. 3 to allow it to assume an inverted V-shape for easy removal.

While a specific form of the improvement has been described and illustrated herein, it is to be understood that the same may be varied within the scope of the appended claim, without departing from the spirit of the invention.

Having thus described the invention, what is claimed and desired secured by Letters Patent is:

A shoring device for excavations comprising: two horizontally elongated substantially vertical side plates; a

reinforcing tube secured to and extending horizontally and medially along the inner face of each side plate; a vertical stiffening member extending between the upper and lower edges of and at each extremity of each side plate to resist bending of said side plates in a vertical plane; a cover plate extending from the upper edge of each side plate downwardly and inwardly over the stiffening members and over the reinforcing tube to the lower edge of the side plate; a sleeve mounted on each extremity of each reinforcing tube; telescoping members connecting the sleeves on one side plate to the sleeves of the other side plate; means for presetting said telescoping members at selected positions of extension; an upper hydraulically expansible device extending from a stiffening member of one plate to a stiffening member of the opposite plate above said reinforcing tubes and at each extremity of said shoring device; a lower hydraulically expansible device extending between said latter stiffening members below said reinforcing tubes; and means for independently actuating said upper and lower hydraulically-expansible devices to tilt said side plates about the axes of said reinforcing tubes.

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