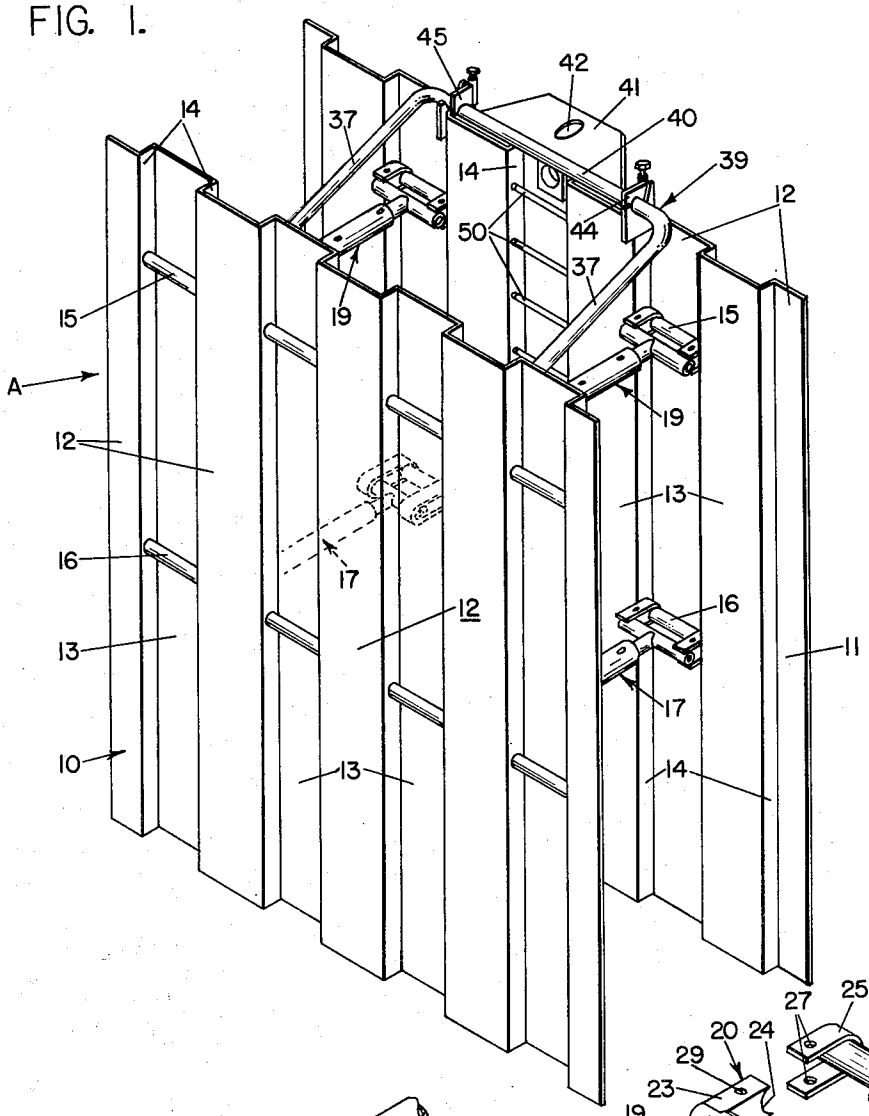
April 17, 1962 P. A. MILLERBERND 3,029,607

DEVICE FOR PREVENTING CAVE-INS

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FIG. 1.



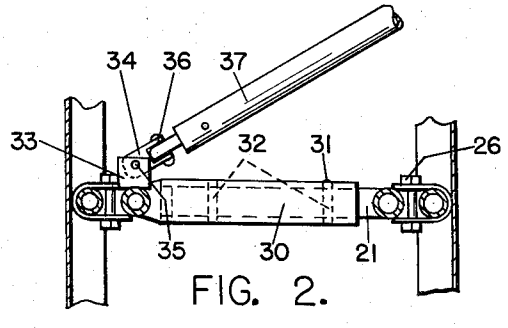


FIG. 2.

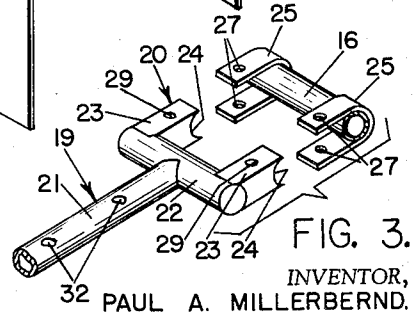


FIG. 3.

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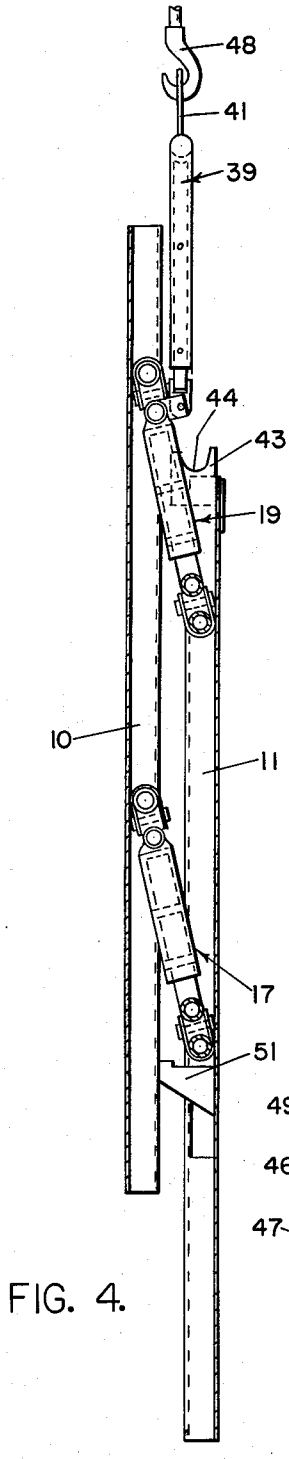


FIG. 4.

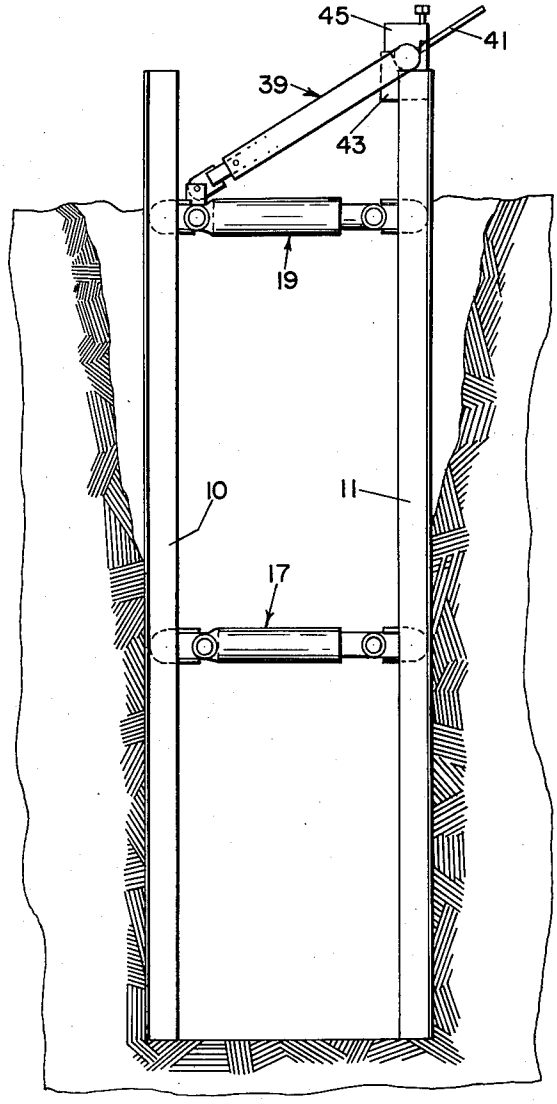


FIG. 5.

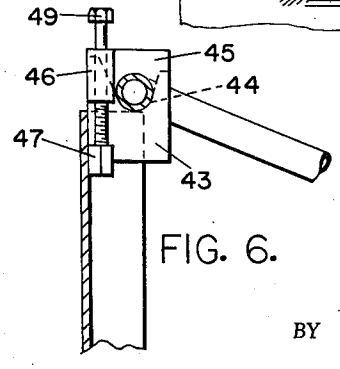


FIG. 6.

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Patented Apr. 17, 1962

3,029,607

DEVICE FOR PREVENTING CAVE-INS

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6 Claims. (Cl. 61—41)

This invention relates to an improvement in a device for preventing caveins and deals particularly with a shoring device including a pair of spaced walls which may be inserted into a trench and the walls locked in parallel spaced relation. At the completion of the work, the walls may be collapsed toward one another and lifted from the trench by a crane or similar device thus facilitating the movement of the apparatus.

In laying pipe lines, sewers and the like, it is usual practice to dig a trench to the proper depth through the use of a power shovel or other suitable digging apparatus. The pipe line is then assembled at the bottom of the trench, and the trench is refilled. During such operations, accidents causing the injury and death of workmen are relatively frequent. If, during the pipe assembly operation or other work at the base of the trench, the walls of the trench give way, there is a good likelihood that one or more workmen will be buried alive or crushed.

In order to protect the workmen, it has been common practice to insert planks in side by side relation on opposite sides of the trench and to provide means for holding these planks in spaced apart relation. Unfortunately, however, from time to time the spacing members are knocked out of place or one of the planks may break and cause a serious accident. It is an object of the present invention to avoid these previous difficulties.

A feature of the present invention resides in the provision of two panels of corrugated sheet metal or the like which are held in parallel relation by a series of connecting links having their ends pivotally connected to the two panels. When the panels are in position to form a shoring structure, the links between the two panels are at substantially right angles to the planes of the panels. However, when the device is to be removed from the trench, the various connecting links may pivot to an acute angle to the panels to which they are attached and the two panels may fold into substantially face to face contact. As a result, the width of the combined panel structure is materially reduced, facilitating the removal of the apparatus from the trench even though the walls of the trench have previously partially collapsed against the panels.

A further feature of the present invention resides in the provision of a locking mechanism for holding the panels in properly spaced relation. The locking means includes a generally U-shaped handle member having an apertured lifting lug thereupon by means of which the structure may be raised and lowered. This handle structure is pivotally attached. The end of the U-shaped handle may swing down into a suitable pair of receiving notches at the upper extremity of the other panel and may be molded or otherwise secured in this position. As the ends of the handle are pivoted to the first panel adjoining the pivots connecting two of the links to this panel, the connecting links combine with the handle to form a rigid A-shaped frame which positively prevents the collapsing of the walls.

These and other objects and novel features of the

present invention will be more clearly and fully set forth in the following specification and claims.

In the drawings forming a part of the specification:

FIGURE 1 is a perspective view of my device for preventing cave-ins, showing the general arrangement of parts.

FIGURE 2 is a cross sectional view through a portion of one of the upper links, showing the construction thereof.

FIGURE 3 is an exploded view of one of the pivotal connections between the links and the panels.

FIGURE 4 is a side elevational view of the device in collapsed form.

FIGURE 5 is a side elevational view of the apparatus in place in a trench.

FIGURE 6 is a sectional view through a portion of the handle showing the mechanism for locking the handle with the panels in expanded position.

The device A includes a pair of generally similar panels 10 and 11 which have been pressed into corrugated form. The corrugations include parallel panel portions 12 on one plane, alternate panel portions 13 on a parallel plane, and generally right angular connecting walls 14.

A pair of vertically spaced pivot shafts 15 and 16 extend through the connecting portions 14 of the corrugated panels, the shaft 15 being spaced from and parallel to the upper edge of its panel and the other shaft 16 preferably being slightly below the vertical centers of the panels. A pair of lower links 17 connect the lower shafts 16 of the panels 10 and 11 while a pair of similar links 19 connect the upper pivot shafts 15 of the panels 10 and 11.

The links 17 and 19 are constructed as may be best illustrated in FIGURES 2 and 3 of the drawings. Each link includes a pair of end members 20 each including a cylindrical shank 21 having a right angularly extending end 22. The shank 21 and end 22 form a generally T-shaped structure. Blocks 23 are welded to the cross member 22 to extend in parallel spaced relation. The blocks 23 are provided with arcuate ends 24 which are curved to fit the curvature of the pivot shaft 15 or 16. A pair of U-shaped straps 25 are designed to encircle the pivot shaft 16 and to embrace the blocks 23 so that the arcuate ends 24 abut against the pivot shaft 15 or 16 to form, with the straps 25, a substantially cylindrical bearing. Bolts 26 extend through aligned apertures such as 27 in the ends of the straps 25 and through apertures 29 in the blocks 23 to hold the parts assembled.

This arrangement is provided to permit the assembly and disassembly of the links without removing the pivot shafts 15 and 16. It also permits the pivot shafts 15 and 16 to be in closely spaced relation to the panel portions 12 because of the relatively narrow width of the connecting portions 14.

Each link 17 or 19 include two of the end members 20 and a connecting tube 30. Alternatively, the links may comprise one end member 20 and a somewhat similar cooperable end member in which the tube 30 takes the place of the shanks 21. In any event, at least one shank 21 is telescoped into the tube 30 where it is held in adjusted relation by pins 31 which extend through the tube 30 and through one of a series of apertures 32 extending through the shank 21.

The upper links 19 are provided with a pair of spaced ears 33 which are designed to accommodate an end

bracket 34. A pivot 35 extends through the ears 33 and bracket 34 to pivotally connect the same. The brackets 34 are connected at 36 to the parallel ends 37 of a generally U-shaped handle 39. The parallel ends 37 are connected by a connecting member 40 to which a lug 41 having a central aperture 42 extending therethrough is welded or otherwise secured. This lug 41 serves as a means of accommodating a crane hook 48 or other suitable hook by means of which the device may be raised and lowered.

A pair of spaced lugs 43 having central notches 44 in their upper edges are designed to accommodate the cross member 40 of the handle 39. The handle cross member 40 is provided with a pair of spaced lugs 45 which are welded or otherwise secured thereto adjacent the lugs 43 when the handle is engaged in the notches 44. Each lug 45 is provided with a tubular barrel 46 which is aligned with a nut 47 welded or otherwise secured to the inner surface of a panel 11. The barrel 46 of each lug supports a bolt 49 which may be threaded into the nut 47 when the handle is engaged in the notched lugs 43 to hold the handle in this position. When thus arranged, a generally A-shaped brace is formed which prevents the pivotal movement of the links 17 and 19 relative to the panels 10 and 11.

In order to facilitate the entry of workmen into the trench, a series of parallel rungs 50 are welded or otherwise secured to extend horizontally between two spaced connecting members 14 of one of the corrugations. These rungs 50 serve as ladder steps to permits the workmen to climb down between the spaced panels 10 and 11.

FIGURE 4 of the drawings shows the structure in its collapsed form and being lifted by engagement of the crane hook 48 with the lug 41. It will be noted that in this position, the panels 10 and 11 are in closely spaced relation. The lugs 43 limit the inward pivoting of the two panels near the top thereof, and cooperable lugs 51 may be provided on the panel 10 beneath the pivot shaft 16 to hold the lower ends of the panels similarly spaced during the lifting and lowering operation of the device.

In the use of the device, several similar devices are usually used in edge abutting relation. Each device is lowered into the trench near one wall thereof with the panel 11 in close relation to the trench wall. When the structure reaches the bottom of the trench, the lower edge of the panel 11 engages the ground. Further lowering of the device causes the links to swing toward horizontal position until the two panels are in the fully expanded position illustrated in FIGURE 1. When in this position, the hook 48 is detached and the handle 39 is swung toward the locking position shown in FIGURES 1 and 5 of the drawings and the fastening bolts 49 are threaded into the nuts 47. The device is now ready for use.

As the work progresses, the rearmost shoring device A is lifted out of place and reinserted into the trench at the opposite end of the other similar units. Thus, the shoring walls may protect the workmen in a desired length of the trench and may be removed and replaced one at a time as the work progresses.

It will also be noted that the lower links 17 are spaced substantially above the lower edges of the panels, permitting the workmen to assemble a pipe or do other work at the bottom of the trench without undue interference. Obviously, if the work being done involves a pipeline having long lengths of pipe, these pipes may be placed into the bottom of the trench before the shoring device is inserted.

In accordance with the patent statutes, I have described the principles of construction and operation of my improvement in a device for preventing cave-ins, and while I have endeavored to set forth the best embodiment thereof, I desire to have it understood that changes may be made within the scope of the following claims without departing from the spirit of my invention.

I claim:

1. A device for preventing cave-ins including first and second panels formed into vertically corrugated form, a pair of vertically spaced pivot shafts extending through the corrugations transversely thereof in parallel relation, pairs of U-shaped straps embracing selected inwardly disposed portions of the shafts of said first panel, a plurality of T-shaped members, one for each pair of U-shaped straps, a pair of spaced blocks carried at the ends of the transverse portion of each T-shaped member and projecting therefrom in a parallel direction for reception by a pair of said U-shaped straps, said straps and blocks having apertures registrable with each other, pin means passing through said apertures for providing a pivotal connection between said T-shaped member and the selected shaft portion with which it is associated, a second T-shaped member having a tubular longitudinal portion for the telescopic reception therein of the longitudinal portion of a first T-shaped member, a pair of spaced blocks carried at the ends of the transverse portion of the second T-shaped member and projecting therefrom in a parallel direction for reception by a pair of U-shaped straps embracing selected shaft portions of the second panel, said last-mentioned U-shaped straps and blocks being similar to the first-mentioned ones, and pin means passing through the apertures of said last-mentioned straps and blocks for providing a pivotal connection between said second T-shaped member and the selected shaft portion with which it is associated, whereby a number of said first and second T-shaped members permit said panels to be collapsed from an expanded parallel relationship into a side by side position.

2. The structure described in claim 1 in which said number of T-shaped members includes two upper first and second T-shaped members and two lower first and second T-shaped members, and locking means inclining upwardly from one end of the upper T-shaped members from a pivotal locus on the transverse portions of two of the upper T-shaped members near one panel to an elevated locus on the other panel, and means for detachably connecting said locking means to said other panel.

3. A device for preventing cave-ins including a pair of panels for use in parallel vertical planes, a series of parallel links each connected at one end to one of said panels for pivotal movement about horizontal axes and pivotally connected at the other end to the other of said panels also for pivotal movement about horizontal axes, said links supporting said panels for pivotal movement from a collapsed side by side position to an expanded position in which said links are substantially at right angles to said panels, a handle pivotally connected to one of said panels and extendable upwardly therefrom intermediate the ends of the panels by means of which said panels may be raised and lowered, and means on the other of said panels engageable with said handle in said expanded position to lock said panels from swinging toward collapsed position.

4. A device for preventing cave-ins including a pair of panels for use in parallel vertical planes, a series of parallel links each connected at one end to one of said panels for pivotal movement about horizontal axes and pivotally connected at the other end to the other of said panels also for pivotal movement about horizontal axis, said links supporting said panels for pivotal movement from a collapsed side by side position to an expanded position in which said links are substantially at right angles to said panels, a handle pivotally connected to one of said panels and extendable upwardly therefrom intermediate the ends of the panels by means of which said panels may be raised and lowered, said handle comprising a U-shaped member having its ends pivotally connected to one of said panels, and notched means on the other of said panels into which the intermediate portion of said handle may extend when said panels are in said expanded position.

5. A device for preventing cave-ins including a pair of panels formed into vertically corrugated form, a pair of vertically spaced pivot shafts extending through the corrugations in a direction parallel to the panels, a pair of links pivotally connected to the portions of the upper pivot shafts extending inwardly of said panels and a similar pair of links pivotally connecting the lower pivot shafts and pivotally connected to the portions of said shaft extending inwardly of said panels, said links supporting said panels in parallel relation to move from a collapsed side by side relation to an expanded spaced apart relation with said links extending substantially normal to the panels, and means for locking said panels in said expanded position, said locking means including a generally U-shaped handle having its ends pivotally connected to one panel along pivots extending in a direction parallel to the panels and including notch means in the other of said panels into which the intermediate portion of the U-shaped handle may engage in the expanded condition of said panels.

6. The structure of claim 5 and including means for locking said handle in said notch means including bolts slidably supported by said handle and engageable with cooperable nuts on said other panel.

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